

EXHIBIT 163

Highly Confidential

UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF NEW YORK

IOWA PUBLIC EMPLOYEES' RETIREMENT
SYSTEM, *et al.*,

Plaintiffs,

vs.

BANK OF AMERICA CORPORATION, *et al.*,

Defendants.

Case No. 17-cv-6221 (KPF)

Reply Expert Report of Haoxiang Zhu

October 5, 2021

Highly Confidential

Table of Contents

	<u>Page</u>
I. INTRODUCTION AND SUMMARY OF CONCLUSIONS.....	1
II. THE INTRODUCTION OF MULTILATERAL TRADING WOULD BENEFIT <i>ALL</i> CLASS MEMBERS	15
III. MULTILATERAL PLATFORMS WOULD HAVE ENTERED THE STOCK LOAN MARKET	27
A. There Are No Fundamental Differences Between Platform Loans and OTC Loans.....	28
1. Recall Protection and Rerate Protection.....	30
2. Other Purported Benefits of OTC Transactions.....	45
3. Stock Loans Are Highly Standardized and Would Trade at Sufficient Volumes to Enable Platform Trading	56
B. Centrally Cleared Platform Trading is Economically Viable	63
1. Regulatory Capital Costs	65
2. CCP Margin Costs.....	82
3. Default Fund Contribution Cost	96
4. Trading Platform Costs.....	98
5. Total Costs.....	101
6. Competitive Abuse of Sponsorship Fees.....	103
IV. ALL CLASS MEMBERS WERE IMPACTED BY THE CONSPIRACY.....	105
A. The Competition Effects of Platforms Would Have Outweighed the Liquidity Effects on the OTC Market.....	106
B. Small Class Members Were Impacted by the Conspiracy.....	111
1. Small Class Members Could Leverage Platform Pricing to Switch to Other Brokers.....	112
2. A Platform in the But-For World Is Viable for Small Borrowers	117
V. MY OPENING REPORT SETS FORTH A RELIABLE ECONOMIC METHODOLOGY FOR DEMONSTRATING CLASSWIDE IMPACT	121
A. My Economic Search Model Shows Classwide Impact.....	121
B. My Yardstick Analysis Supports a Showing of Classwide Impact.....	128
1. Multilateral Trading Thrives in Non-U.S. Stock Lending Markets.....	128
2. The United States Repo Market Supports My Opinions on Antitrust Impact	141
3. My Yardstick Markets Are Comparable	147
4. The Presence of Non-Anonymous Multilateral Trading in My Yardstick Markets Supports My Opinions of Antitrust Impact.....	154
VI. CONCLUSION	163

I. INTRODUCTION AND SUMMARY OF CONCLUSIONS

1. In my opening report, I explained how it made economic sense for multilateral trading platforms to enter the stock lending market and how such entry would have benefitted all or virtually all Class members on both the “borrow” and “lend” sides of the market. Specifically, in the existing over-the-counter (“OTC”) market structure, traders seeking to lend or borrow stocks must engage in a costly search process that allows the prime brokers—intermediaries in the market—to charge inflated spreads. The introduction of multilateral trading decreases those search costs for all Class members that would engage in platform trading. This is because platform trading makes it possible to obtain multiple binding quotes at once and effectively compare prices. In addition, the increased transparency and competition flowing from multilateral trading venues *also* decreases transaction costs for Class members that choose to stay OTC.

2. I reached these conclusions through an application of my economic search model, which shows that all Class members benefit from the introduction of multilateral trading platforms, even when those platforms achieve only modest success in the market. I also confirmed my results through a yardstick analysis of the stock lending market as compared with other markets, analysis of empirical results showing how AQS impacted prices in the real world, and an analysis of the record evidence produced in the litigation.

3. In response, Defendants’ experts advance a variety of critiques that they claim disprove my opinion that all or virtually all Class members were impacted by the alleged conspiracy. I have carefully reviewed these critiques and find they do not alter my opinions. I explain why in detail throughout the body of this reply report.

4. The primary expert report responsive to my own was submitted by Professor Terrence Hendershott (“Prof. Hendershott”). Before addressing the specific arguments made in

his report, let me first point out that Prof. Hendershott's own academic research conducted outside the litigation context provides compelling support for my analysis. Prof. Hendershott published an empirical study of the impact that MarketAxess, an electronic trading platform offering the "request-for-quote" protocol, had on the corporate bond market. He concluded that "the option to trade corporate bonds in an electronic auction improves prices with an annual savings of \$2 billion."¹ Prof. Hendershott characterized this \$2 billion as a "conservative annual estimate" that "is likely to grow over time as the range of order sizes over which the electronic auction mechanism dominates increases."² He also pointed out that "most large investors" used "both electronic and voice" options for their trades during the time period under study.³ And these results occurred even though MarketAxess had a relatively small penetration in the corporate bonds market of about 10%. As in the corporate bonds market, which is one of the markets I consider in my yardstick analysis, my economic search model predicts that even a modestly successful entry by a platform would result in enormous benefits for all or virtually all Class members.

5. Prof. Hendershott argues that the *addition* of a trading platform option might not help all investors if that option decreased the quality of the pre-existing OTC market structure. But to establish hypothetical lower quality, Prof. Hendershott cites a "prominent market structure textbook" for the proposition that "[w]ithin any given market structure, liquidity is greatest and transaction costs are lowest when all traders trade in that structure."⁴ At the same time, Prof. Hendershott omits that the same book explains: "Market diversity, however, does not necessarily

¹ Terrence Hendershott & Ananth Madhavan, *Click or Call? Auction versus Search in the Over-the-Counter Market*, 70 J. Fin. 419, 446 (2015).

² *Id.* at 434.

³ *Id.* at 431.

⁴ Expert Report of Terrence Hendershott ¶ 365, ECF No. 432-1 ("Hendershott Rpt.").

imply inferior price formation and high transaction costs. Traders can obtain the benefits of consolidation in fragmented markets when information flows freely between market fragments, and when some traders can choose which fragment in which to trade.”⁵ There are no reasons why information would not flow freely in this market between platforms and the but-for OTC segment, and there are no reasons that would preclude at least some market participants from trading in both (as in the corporate bonds market). As long as *some* traders trade in both the platform segment and the OTC segment, their activities would ensure that the benefit of competition brought by the platform also spills over to the OTC segment. Therefore, I believe it is implausible that the OTC segment would be worse off in the but-for world.

6. Throughout his rebuttal report, Prof. Hendershott incorrectly suggests I took the position that the OTC segment will be eliminated in the but-for world, stating I have suggested “the prime brokers’ role in stock lending would have been largely reduced to serving as clearing sponsors on anonymous platforms.”⁶ I have never suggested any such thing. My comparison has never been “all investors move to platform vs. all remain OTC”; rather, the comparison is “platform + OTC vs. OTC only.” My economic search model predicts class-wide impact on *all* investors, even assuming that platform trading achieves only a modest share in the marketplace. As I explained in my opening report, I expect that the OTC segment will remain, and some Class members will continue to execute broker-intermediated trades in the OTC segment.⁷ The

⁵ Larry Harris, *Trading and Exchanges: Market Microstructure for Practitioners* 533 (Oxford University Press 2003).

⁶ Hendershott Rpt. ¶ 214.

⁷ Expert Report of Haoxiang Zhu ¶¶ 341-45, ECF No. 414-9 (“Zhu Rpt.”) (“While a substantial portion of stock lending volume is likely to have migrated to electronic platforms such as AQS absent the conspiracy, a certain portion of stock loan volume would likely have continued to be transacted through the Prime Brokers’ two-tier OTC market structure, especially in the initial period following the introduction of the platform.”).

coexistence between an exchange segment and an OTC segment is quite common in many financial markets and would be the likely result for stock loans as well. Even in this case, I show that *all* investors will be better off in the but-for world, including those who transact OTC.

7. Prof. Hendershott identifies “three principal reasons” that some Class members would be worse off in a more competitive and transparent market. These reasons are (1) that the favorable prices and favorable treatment some Class members received in the actual world would no longer be available to those Class members in the but-for world; (2) that Class members continuing to trade OTC would not get superior prices after the introduction of a platform; and (3) that Plaintiffs have failed to “quantify any benefits from additional transparency” and presumably therefore do not have reliable evidence that additional price transparency would benefit Class members.⁸

8. I have considered these arguments closely in light of the evidence. None alters my core opinion that all or virtually all Class members were impacted by the alleged conspiracy. I address Prof. Hendershott’s “three principal reasons” in this overview section, and then treat them in more depth in the body of my reply report.

9. Prof. Hendershott **first argues** that Class members would be worse off in the but-for world because “the favorable prices and favorable treatment some Class members received in the actual world would no longer have been available to those Class members in the but-for world.”⁹ His primary support for this assertion is that (1) beneficiaries of price dispersion in the real world may lose out when there is price convergence in the but-for world, (2) Class members may lose relationship/reputational benefits that they enjoy with OTC dealers in the real world,

⁸ Hendershott Rpt. ¶¶ 23-26.

⁹ *Id.* ¶ 24.

and (3) Class members may be harmed if they lose access to, or would pay higher prices for, “the bundle of services brokers provide.”¹⁰

10. Regarding price dispersion, my impact opinion does not rely on price convergence in the but-for world. My economic search model features price *distributions*, where Class members receive prices drawn from certain probability distributions calibrated to the real-world data found in the stock lending market. My model shows that those distributions become superior in the but-for world from end users’ perspective, benefiting all Class members. Prof. Hendershott’s “price convergence” argument gives the misleading impression that with the addition of the platform, good prices become average and bad prices become average. In fact, what happens in the model—and what I believe will happen in the but-for world—is that bad prices get better and good prices also improve. In the theoretical limit, as search frictions reduce to zero, the market becomes fully competitive, and all prices converge to intermediaries’ cost. Therefore, a converged price, if it happens at all, would likely be superior to *all* prices found in the real world.

11. Regarding the alleged relationship/reputational benefits, little quantitative evidence is provided by the Defendants’ experts. I noted in my opening report that such benefits are often theorized, but not shown with concrete evidence. Dealers may try to convince their clients that such “benefits” exist, and some clients may even be under the impression that they receive such benefits. But those supposed benefits are often too illusive and intangible to have direct bearings on any reliable economic analysis. If anything, there is academic evidence showing that “relationships” do not improve the prices that customers receive.

¹⁰ *Id.*

12. More fundamentally, even if the relationship/reputational benefits do exist (albeit difficult to measure), they would remain in the but-for world. I have not opined that the OTC segment would collapse in the but-for world. To the contrary, I expect a robust OTC segment to remain for dealer-intermediated trades where such trades benefit Class members. It is possible that some Class members could still want to trade OTC at least sometimes for a variety of reasons, including those suggested by Defendants' experts, such as leveraging strong "relationship" benefits or accessing bundled ancillary services from the dealers. Again, the scenario is the *addition* of a platform. From the perspective of antitrust impact, the key fact is that OTC *prices* in the but-for world would be superior to OTC prices in the real world, due to increased transparency and lower search costs caused by the platform.

13. That but-for world OTC prices would be superior is borne out in my economic search model. That model shows that *even traders who remain OTC* receive superior prices after the introduction of a trading platform. This shows Class members that wanted to continue to transact OTC could continue to do so but at superior prices. They would benefit from the introduction of multilateral trading, and therefore they too have been impacted by the alleged conspiracy. It is therefore not the case that alleged "favorable treatment some class members received in the actual world would no longer have been available."¹¹

14. Regarding "the bundle of services brokers provide," my response parallels the relationship benefits argument. First, the alleged bundle of services does not have as much economic value as Prof. Hendershott implies—if it has value at all. At my deposition, for example, I explained that [REDACTED]

¹¹ *Id.*

[REDACTED].¹²

Presumably, once institutional investors realized how much they pay for the research, they decided the research is not worth the money. I would expect many of these ancillary services to suffer the same fate—when forced to compete as standalone products, they have fewer buyers. One should therefore view this value-of-bundled-services claim with a high degree of skepticism.

15. At the same time, if there are end users who value such services and wish to remain OTC, there is no reason why prime brokers could not continue to offer these services in the but-for world. Because the OTC segment would remain in the but-for world, Class members would continue to have access to the same “bundle of services” that exists now in the real world—if they choose to. The only difference is that Class members would pay *less* for the trading component of the bundle. They would therefore be better off in the but-for world, even if they continued to trade OTC.

16. I also expect that the ancillary services, if desired by Class members, would be offered by prime brokers on a stand-alone basis or would be available on platforms. This is particularly true for prime brokers acting as sponsoring agents to the clearinghouse. Such prime brokers will already have Class member relationships and will have a natural incentive to continue offering the same ancillary services. Thus, the addition of a platform in the but-for world does not disrupt ancillary services: those end users who wish to purchase the bundled service can continue to do so, whereas those end users who wish to purchase the unbundled services can do it as well. Both types, of course, benefit from better prices in the transactions of stock loans, as I discussed above.

¹² Zhu Tr. 376:25-381:8.

17. Prof. Hendershott's **second argument** is that OTC prices would not improve for some Class members after the introduction of a platform.¹³ He claims that "[t]he academic literature does not support the notion that OTC prices always tend to be 'disciplined' by an increase in platform or exchange trading."¹⁴ Of course, "always" is too strong and too broad a claim to be held true universally. But it is my opinion that economic analysis of *this specific market* indicates that OTC prices would be disciplined by the introduction of platform or exchange trading. As I explained in my opening report, the evidence in this case overwhelmingly supports this proposition. For example, the stock loan market has large transaction volume and tight connection with the stock market; the economic search model shows price discipline is effective; and evidence in stock markets and corporate bond markets show that competition is effective in disciplining prices.

18. Prof. Hendershott also claims that some Class members would not benefit from the introduction of platforms if trading on those platforms would not be a "credible" option for those Class members. Not so.

19. First, prime brokers do not have absolute knowledge about whether Class members could or could not use platforms, or at what price. Prime brokers have some knowledge of the Class member's past trading records, and some general knowledge about Class members' size and sophistication. But prime brokers do not know with certainty what types of fee arrangements or contracts Class members could negotiate with platforms.

20. Rational platforms would also set prices that are specific to different categories of users. When possible, it is rational to charge higher prices to those who have high values for the

¹³ Hendershott Rpt. ¶ 25.

¹⁴ *Id.*

service and lower prices to those who have low values. For example, data providers often charge lower subscription fees to smaller institutions that have fewer people who use the data. It would not surprise me as an economist to learn that a trading platform like AQS would adjust prices in this way too—waiving upfront or recurring “fixed” fees for small end users. For example, [REDACTED]

[REDACTED] stated in his declaration that “[REDACTED]

[REDACTED]

[REDACTED]”¹⁵ He also explains that “[REDACTED]

[REDACTED]




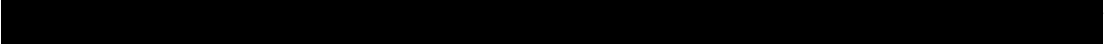
[REDACTED]”¹⁶

A decision to waive upfront or recurring fixed fees for small end users would be rational to help grow participation on the platform, particularly during the early stages of the platform’s existence.

21. Second, even if an end user’s prime broker had some imperfect knowledge about the end user, that does not mean *all* prime brokers would have such knowledge. Prime brokers compete against one another, and even a small hedge fund like Torus switched prime brokers during the Class Period. When small Class members are shopping around, the potential new prime brokers cannot possess reliable information about their trading patterns. Only a small hedge fund’s *actual* prime broker would have reliable information about trading patterns, and that prime broker would have a clear incentive not to share any information with its rivals (absent collusion).

¹⁵ Declaration of [REDACTED] (“[REDACTED] Decl.”) ¶¶ 7-9.

¹⁶ *Id.*

22. Prof. Hendershott's **third reason** is that Plaintiffs have failed to “quantify any benefits from additional transparency”¹⁷ and presumably therefore do not have reliable evidence that additional price transparency would benefit Class members. He claims that Plaintiffs have supported the benefits of price transparency only using “references to the academic literature studying financial markets other than stock lending.”¹⁸ I disagree. As I discussed in my opening report, the positive value of price transparency to investors has been shown over and over again in many markets, including stocks, corporate bonds, municipal bonds, structured products, and OTC derivatives, among others. The absence of the stock loan market in this long and expanding list of markets—of all colors and shapes—reflects the outdated nature of stock loan market structure more than anything else. Indeed, the stock loan market has been described “ ” and a “ ”¹⁹ In addition, while Prof. Hendershott argues my analysis does not “quantify any benefits from additional transparency,” such allegations have a circular logic because transactions in this case were executed while the conspiracy was in place. In the absence of conspiracy, I expect that enhanced transparency would benefit end users in the stock loan market as it did for end users in all those markets cited above.

23. Prof. Hendershott also states that some Class members “benefited from a relative lack of transparency in the actual world” because they were able to maintain the confidentiality of their trades.²⁰ On that point, note that price transparency is not the same as identity

¹⁷ Hendershott Rpt. ¶ 26.

¹⁸ *Id.*

¹⁹ 

²⁰ *Id.* ¶ 27.

transparency; the identities of end users are kept confidential in the platform, although the prices are made transparent. In addition, large institutional investors have extensive experience in trading in transparent markets such as the U.S. stock market and have developed algorithms to minimize the risk that others can guess their identities based on trades. Finally, it is not obvious that trading OTC with a broker-dealer would fully protect an end user's confidential information because the broker-dealer may be the very source of information leakage.

24. As a final point, Prof. Hendershott claims “determining how a given class member would have fared in the but-for world relative to the actual world requires ascertaining, among other things, (a) which Class members would have been willing and able to transact on a platform like AQS; (b) which transactions they would have been able to conduct there; (c) whether they would have had access to incremental information in the but-for world from either a platform like AQS or from third-party data providers such as Data Explorers; (d) what incremental costs they would have incurred to trade on a platform or access additional transparency; (e) whether better prices would have been available to them in the but-for world (either trading OTC or on a platform); (f) whether they would have experienced lower loan quality or reduced lending or borrowing opportunities in the but-for world; and (g) whether the price or availability of other bundled services (such as recall protection) would have changed in the but-for world.”²¹

25. This long list of proposed inquiries seems to stem from Prof. Hendershott's misinterpretation or misrepresentation of the but-for world in my opening report. Again, my but-for world is not one in which there is only a platform; rather, my but-for world has both a platform segment and an OTC segment, and each end user chooses the segment that serves it

²¹ *Id.* ¶ 28.

better on any particular trade. As discussed above, in the but-for world, the OTC segment is still available to end users who demand it, but the prices are now better for end users due to the competition brought by the platform. This means end users are better off even on trades they transact OTC. End users who switch to the platform for at least some of their trades, despite improved OTC prices, are obviously better off, by the revealed preference of their switching. Once viewed this way, it becomes apparent that one does not need to answer *any* of these questions in Prof. Hendershott's list to show from an economic perspective that all Class members are better off absent the conspiracy. I spell out this logic more formally in an analytical framework in the body of my reply. To address his specific list items:

- Whether or not a Class member “would have been willing and able to transact on a platform” does not affect the impact inquiry, because I have shown class members are better off in the but-for world *regardless of whether* they continue to trade OTC or switch to a platform. Thus, class members are impacted regardless of whether they “would have been willing and able to transact on a platform.” Even if one were to answer that in the negative, the class member would *still* be better off in the but-for world given the lower prices that would prevail in the but-for OTC segment.
- Similarly, “which transactions they would have been able to conduct there” does not matter. Again, end users choose between the platform segment and the OTC segment, whichever works better for them on a particular trade. Particular transactions in the but-for world would be better off regardless of whether those particular transactions occur OTC or on-platform in the but-for world.
- Whether “they would have had access to incremental information in the but-for world from either a platform like AQS or from third-party data providers such as Data

Explorers” again does not affect my opinion on impact for any Class member. Having access to the option of incremental price transparency can only help Class members, even if they continue to trade OTC. The fact that *some* Class members will use transparency services means that *all* Class members, including those who remain OTC, benefit from it. That is the core result from the search model in my opening report.

- “[W]hether better prices would have been available to them in the but-for world” does not necessitate individualized inquiry. Under the impact framework set forth in my opening report, all or virtually all Class members would receive better quotes in the but-for world, whether they trade OTC or on-platform. When a platform is introduced, Class members obtain the option of accessing a more competitive, transparent price on the platform. And because dealers cannot know which Class members have access to the more transparent price, they offer better prices through OTC as well.
- “[W]hether they would have experienced lower loan quality or reduced lending or borrowing opportunities in the but-for world” is again not an individualized inquiry relevant to antitrust impact. A robust OTC segment remains in the but-for world where any perceived or actual ancillary services or other benefits would be available. And because the introduction of a platform increases price competition and transparency, the OTC price in the but-for world will be superior to OTC prices offered in the real world. Thus, Class members will have access to the same “loan quality” and “lending or borrowing opportunities” that they had access to in the real world, but at a better price.
- Finally, “whether the price or availability of other bundled services (such as recall protection) would have changed in the but-for world” does not affect my impact analysis. All of the alleged bundled services that exist in the real world would also exist in the but-

Highly Confidential

for world—accessible from dealers operating in the OTC segment and/or from prime brokers sponsoring client access to the platform and central counterparty (“CCP”). I also believe some of these ancillary services would be unbundled and hence have more competitive prices. I see no economic basis for concluding that the price of those services would increase, or quality would decrease. To the contrary, it would be in the economic self-interest of prime brokers to compete on quality and price, especially after some of the services are unbundled.

II. THE INTRODUCTION OF MULTILATERAL TRADING WOULD BENEFIT ALL CLASS MEMBERS

26. In my opening report, I demonstrated that the economic evidence available in this case shows *all* Class members were impacted due to the lack of entry by multilateral trading platforms. That includes Class members that would transition in whole or in part to platform trading in the but-for world, and it *also* includes Class members that would remain entirely OTC. These conclusions hold *even if* the platform captures only a small or modest share of the market.

27. Specifically, in my economic search model, I assumed the pre-platform world had approximately 28% fast traders in the OTC regime.²² I modelled the entry of a multilateral trading platform achieving a penetration of roughly 22%, raising the proportion of “fast” traders from roughly 28% to 50%.²³ Using these parameters, my model shows that a platform achieving even a modest share benefits everyone, even those that choose not to utilize the platform in the but-for world.²⁴

28. Defendants’ critique is mainly set out in the report of Prof. Hendershott. Notably, his academic research provides strong confirmatory support for my analysis of classwide impact. Specifically, the corporate bonds market, which Prof. Hendershott studied outside the context of this litigation, provides a compelling example of how these effects could occur. Like the U.S. stock loan market, the U.S. corporate bond market was traditionally one with “relatively large transactions costs” that stemmed “from the OTC structure of the bond market.”²⁵ The platform MarketAxess entered the corporate bond market and provided an electronic request for quote

²² Zhu Rpt. ¶ 275.

²³ Zhu Rpt. ¶ 275. The platform itself in my model converts only the 22% share—I assume that the 28% share of pre-existing fast customers would remain fast for whatever reason(s) they were fast before the platform came to market.

²⁴ *Id.* ¶¶ 279-88.

²⁵ Hendershott & Madhavan, *Click or Call*, *supra* note 1, at 420.

(“RFQ”) option for traders.²⁶ RFQs are auctions, a form of multilateral trading as explained in my opening report. After MarketAxess entered, “most large investors” used “both electronic and voice” options for their trades.²⁷

29. Creating an option of RFQ trading in the corporate bond market brought significant benefit to investors. In his paper, Prof. Hendershott sought to “roughly assess the economic impact of the introduction of electronic auctions into an OTC environment.”²⁸ He concluded that “the option to trade corporate bonds in an electronic auction improves prices with an annual savings of \$2 billion,”²⁹ reflecting a transfer from dealers to investors, a figure he viewed as a “conservative annual estimate” that “is likely to grow over time as the range of order sizes over which the electronic auction mechanism dominates increases.”³⁰

30. While Prof. Hendershott claimed at his deposition that “conservative” means “leaves out a variety of things,”³¹ the standard definition for “conservative” in economics is the deliberate understatement of an effect under study, implying that Prof. Hendershott’s \$2 billion estimate for corporate bond savings likely *understates* the value conferred on investors.

31. MarketAxess was able to bring these large benefits to corporate bond traders even though it garnered a fairly modest 10% of the market at the time of Prof. Hendershott’s 2015 analysis.³² The corporate bond market is thus a compelling example of how classwide impact would occur in the stock lending market even after a fairly modest portion of the market transitions to multilateral trading, and I include it in my yardstick analysis.

²⁶ *Id.* at 421-22.

²⁷ *Id.* at 431.

²⁸ *Id.* at 433.

²⁹ *Id.* at 446.

³⁰ *Id.* at 434.

³¹ Hendershott Tr. 70:21-22.

³² See Hendershott & Madhavan, *Click or Call*, *supra* note 1, at Table 1.

32. Prof. Hendershott later published an article showing the effects of all-to-all trading, known as “open trading,” introduced by MarketAxess in 2012.³³ Notably, that research concluded that the introduction of all-to-all trading benefited *not only* those who used the new protocol, *but also* those that used the traditional MarketAxess RFQ protocol.³⁴ That was because the introduction of all-to-all trading led to “more aggressive dealer bidding” and “when OT [open trading] bidding is more prevalent dealers bid more competitively (conditional on the number of dealers).”³⁵ This is consistent with the well-accepted economic principle that more competition leads to better prices and benefits consumers.

33. Prof. Hendershott’s all-to-all study also shows the market effects of additional liquidity created by new entrants and end-user corporate bond traders. As explained in the paper, “[t]he largest component of Open Trading comes from the entry of new liquidity providers that act like dealers” and thus “OT also provides evidence on the impact of investors being able to trade with dealers who are not in their network and the ability of non-dealers to become dealers.”³⁶ Again, competition worked to the benefit of investors.

34. These empirical results support my opinions that a trading platform entering the stock lending market, even with modest volumes, would bring benefits to all Class members. And this is true whether they utilize the trading platform or not.

35. This may explain why Defendants’ rebuttal erroneously focuses on a different but-for world: a world with only platform trading. They argue that an all-platform world would be inferior to an all-OTC world, but that is a straw man, not the but-for world described or

³³ Terrence Hendershott et al., *Do We Need Dealers in OTC Markets?* 2021

³⁴ *Id.* at 39 (showing “investors receiving roughly 1 basis point better prices due to more aggressive dealer bidding”).

³⁵ *Id.*

³⁶ *Id.* at 42.

analyzed in my opening report.³⁷ For example, Prof. Hendershott opines that his study does not mean “‘all or virtually all’ market participants would be better off with electronic trading” because “investors choose their preferred trading venue not just based on where they achieve the lowest spreads, but to minimize the risk of information leakage.”³⁸ But that is *consistent* with my theory of impact—I have never opined that platforms would capture the *entire* market. To the contrary, my view is that, absent a conspiracy, platforms would capture a significant but not majority share of the stock lending market, at least initially.

36. In an attempt to distinguish the corporate bond market from the stock lending market, Prof. Hendershott claims that the introduction of trading platforms here would cause a liquidity externality in the OTC market, harming those that continue to trade OTC.³⁹ One of his main sources of support for this liquidity externality is what he describes as a “prominent market structure textbook,” written by Professor Larry Harris. He cites this textbook for the proposition that “[w]ithin any given market structure, liquidity is greatest and transaction costs are lowest when all traders trade in that structure.”⁴⁰ But the same book explains “[m]arket diversity, however, does not necessarily imply inferior price formation and high transaction costs. Traders can obtain the benefits of consolidation in fragmented markets when information flows freely between market fragments, and when some traders can choose which fragment in which to trade.”⁴¹ As detailed below, economic analysis indicates Class members here would indeed “obtain the benefits of consolidation in fragmented markets” because the conditions discussed in

³⁷ See, e.g., Hendershott Rpt. ¶ 214 (“Plaintiffs’ experts suggest that in the but-for world, the prime brokers’ role in stock lending would have been largely reduced to serving as clearing sponsors on anonymous platforms.”).

³⁸ *Id.* ¶ 193.

³⁹ *Id.* ¶¶ 363-67.

⁴⁰ *Id.* ¶ 365.

⁴¹ Harris, *supra* note 5, at 533.

that textbook hold here. Ultimately, Prof. Hendershott’s purported “liquidity externality” will be positive for investors who remain OTC, not negative.

37. In general, if the OTC segment remains in the but-for world, which I believe is the case, many of Defendants’ arguments collapse into the same basic assertion—that is, in the real world, Class members receive a number of ancillary benefits (like market research), generally favorable treatment from their prime broker of choice, or value-added services that are included in the price they pay for stock loan transactions (like recall protection). In this section, before addressing all of Defendants’ arguments with specificity, I prove that if (1) these ancillary benefits and services would be available in the but-for world at the same quality-adjusted price that they are available in the real world, (2) platforms attract sufficient volume to enter the market and influence prices, both on and off platform, and (3) the “competition” effects of the platform outweigh the potential adverse “liquidity” effects on the OTC segment, then it follows as a matter of economic certainty that all Class members are better off in the but-for world.

38. Consider the trade j of a generic client. Let’s assume that the client undertaking trade j receives some ancillary services with fair market price a_j , that is, a_j is the price at which a client can purchase the ancillary service on a stand-alone basis. The price represented by this variable encapsulates all of the ancillary benefits and services posited by Defendants’ experts, including recall protection, “relationship” trading benefits, better access to HTB stock, and the like. In the real world, suppose the client pays $OTC\ Cost_j^{ACT}$ to the dealer. Necessarily, therefore, the price for the actual *stock loan* (not including the ancillary services) is $OTC\ Cost_j^{ACT} - a_j$.

39. The but-for world is different, and creates an optionality for the Class member undertaking trade j . Specifically, the Class member chooses between four options: (1) trading

OTC in the but-for world just like in the actual world, (2) trading on-platform but purchasing ancillary services elsewhere, (3) trading on-platform but not purchasing ancillary services at all, and (4) trading OTC in the but-for world but not purchasing ancillary services at all. The last two options would happen if a specific Class member thought the value of the ancillary services for the specific Class member did not exceed their but-for world price.

40. Each of these options can be expressed mathematically. If a Class member continues to trade OTC in the but-for world, they must pay $OTC\ Cost_j^{BFW}$ in total. Like in the real world, that can be broken into two components: a_j for ancillary services and $(OTC\ Cost_j^{BFW} - a_j)$ for the stock loan.

41. If the Class member trades on the platform and separately purchases the ancillary services from the dealers or other providers, the Class member pays two separate prices. First, the Class member pays $Platform\ Cost_j^{BFW}$ to the platform for the stock loan. Second, the Class member pays a_j to the seller of ancillary services. The Class member's total price is $Platform\ Cost_j^{BFW} + a_j$. Note that $Platform\ Cost_j^{BFW}$ includes not only the spread, but also incremental costs related to technology, capital requirements, and other considerations. The latter category of incremental cost can be positive or negative, i.e., it is possible that the platform produces savings for the client.

42. If the Class member trades on the platform but foregoes ancillary services, they pay $Platform\ Cost_j^{BFW}$. If they do not value the ancillary services at a sufficient level to pay for them, then they will not do so. Thus, the Class member's total price is $Platform\ Cost_j^{BFW}$.

43. These scenarios are summarized below:

Scenario No.	Description	Total Price	Ancillary Services Price	Stock Loan Price	Client's gross value received
1	Real-World OTC Bundle	$OTC Cost_j^{RW}$	a_j	$OTC Cost_j^{RW} - a_j$	$U_j(\text{trade, ancillary})$
2	BFW OTC Bundle	$OTC Cost_j^{BFW}$	a_j	$OTC Cost_j^{BFW} - a_j$	$U_j(\text{trade, ancillary})$
3	BFW Platform w/ Ancillary Services	$Platform Cost_j^{BFW} + a_j$	a_j	$Platform Cost_j^{BFW}$	$U_j(\text{trade, ancillary})$
4	BFW Platform – Stock Loan Only	$Platform Cost_j^{BFW}$	0	$Platform Cost_j^{BFW}$	$U_j(\text{trade, no ancillary})$
5	BFW OTC – Stock Loan Only	$OTC Cost_j^{BFW} - a_j$	0	$OTC Cost_j^{BFW} - a_j$	$U_j(\text{trade, no ancillary})$

44. Clearly, in scenarios 1, 2, and 3, the client makes the stock loan transaction and receives the ancillary service, so the gross value to the client is the same, denoted $U(\text{trade, ancillary})$. Among these three choices, what matters is the total price paid, with lower price being better for the client. For scenarios 4 and 5, the client makes only the stock loan transaction and receives no ancillary service, so the gross value is denoted $U(\text{trade, no ancillary})$. But the client does not pay for the ancillary service, either.

45. In the but-for world, a client takes the maximum of these four choices when making a decision of where to make the transaction and whether to purchase the ancillary service, that is, the client's total surplus on this particular trade in the but-for world is

$$\begin{aligned} & \max [U_j(\text{trade}, \text{ancillary}) - OTC \text{ Cost}_j^{BFW}, \\ & U_j(\text{trade}, \text{ancillary}) - \text{Platform Cost}_j^{BFW} - a_j, \\ & U_j(\text{trade}, \text{no ancillary}) - \text{Platform Cost}_j^{BFW}, \\ & U_j(\text{trade}, \text{no ancillary}) - OTC \text{ Cost}_j^{BFW} + a_j] \end{aligned}$$

46. Because the maximum of four numbers is greater than or equal to each of the four numbers, we know that the client's total surplus on this trade in the but-for world is at least as high as:

$$U_j(\text{trade}, \text{ancillary}) - OTC \text{ Cost}_j^{BFW}.$$

47. On the other hand, the client's total surplus on this trade in the actual world is:

$$U_j(\text{trade}, \text{ancillary}) - OTC \text{ Cost}_j^{RW}.$$

48. This means that a sufficient condition of impact on any particular trade j of a client is that $OTC \text{ Cost}_j^{BFW} < OTC \text{ Cost}_j^{RW}$. If that inequality holds, then the Class member is impacted on trade j , regardless of whether they find ancillary services highly valuable or of no value at all. Their valuation of ancillary services simply does not matter for the question of antitrust impact because they cancel out in the comparison. All that matters is that the total price of the OTC "bundle of services" in the but-for world is less than the total price of the OTC "bundle of services" in the real world. This core result fully answers the bulk of Defendants' criticisms and shows Class members' individual valuation of ancillary services is irrelevant to the question of whether Class members experienced antitrust impact.

49. Because the economic evidence indicates that OTC prices, on average, would decrease in the but-for world, a Class member would need to be extremely unlucky to have this inequality not hold for all of its trades. “Unlucky” here means the noise in the price consistently goes against the end user. I address this point in my opening report in connection with my search model, where I explained that, because of the law of large numbers, Class members would have to be implausibly unlucky to have all of their trades be worse in the but-for world relative to the real world.⁴²

50. It merits emphasis that my approach establishes a sufficient condition for classwide impact. For this purpose, I have ignored the potential harm caused by the real-world OTC segment in that Class members are forced to purchase a bundle of ancillary services that they do not actually find valuable, that is, $U_j(\text{trade}, \text{no ancillary}) > U_j(\text{trade}, \text{ancillary}) - a_j$. In that case, many Class members in the but-for world would lean towards Scenarios 4 and 5 in my chart above—utilizing the platform *without* ancillary services or participating in the unbundled OTC segment. As I explained in my opening report, many of the ancillary services and other benefits cited by dealers have at best dubious value. This is especially the case for any services that are not transaction-specific (like capital introduction or market research), as multi-primed class members would needlessly be paying for such services more than once.

51. For example, suppose in the real world a Class member paid 100 bps for a stock loan that included 30 bps of ancillary services and 70 bps for the actual stock loan. Suppose also that the Class member valued the ancillary services at 20 bps. This Class member is *harmed* because he is implicitly forced to purchase ancillary services at 30 bps *even though* he only values such services at 20 bps. In the but-for world, suppose the price of the bundle decreases to

⁴² Zhu Rpt. ¶ 287.

80 bps (30 bps for the ancillary services and 50 bps for the stock loan). In the but-for world, the Class member would only pay 50 bps for the loan and would not have purchased the ancillary services at all. In theory, therefore, the Class member's economic harm is 10 bps caused by the forced bundle purchase plus 20 bps for the stock loan overcharge, yielding a total of 30 bps of harm. My approach above establishes that the 20 bps in the reduction in the transaction cost of stock loans is a lower bound of the harm caused by the OTC market structure, and this lower bound does not depend on the value of any client for the ancillary services.

52. While the framework above is illustrated with the entry of a multilateral trading platform, it also holds for the addition of a CCP or the implementation of post-trade transparency.

53. This framework generally matches up with economic intuition as well. To elaborate, let me go through the example of ridesharing Apps like Uber and Lyft. Do travelers benefit from the entry of Uber and Lyft? Yes. They tend to be cheaper and cleaner than taxis. Facing competition, taxis improve their services (e.g., cleaner cars) or reduce prices.

54. Taxi drivers would nonetheless suggest that their licensure and corresponding regulations are valuable ancillary services to consumers that must be considered as part of a bundled taxi price. But faced with competition from Uber and Lyft, taxis will need to decrease the price on their transportation service of getting from Point A to Point B. That will likewise decrease the price of the overall taxi "bundle," ensuring that even consumers that strongly prefer taxis are better off after the introduction of Uber and Lyft. Competition benefits everyone, even those that participate in the legacy regime for their own reasons.

55. If, hypothetically, taxi companies engage in a successful group boycott of Uber and Lyft, and were faced with an antitrust lawsuit, I also expect taxi companies to argue that

entrants like Uber and Lyft are not viable business models. Would riders really trust a phone application to connect them with drivers? Wouldn't consumers be radically afraid of getting into the car of a stranger?

56. As a first point, if Uber and Lyft were not viable business models, it would not be rational for taxi companies to engage in a group boycott. Why engage in the trouble of a conspiracy if the threat is non-existent? Basic economics teaches that the revealed preferences of economic agents through their actions can say a lot of about the underlying costs and benefits of various activities. The very fact that a conspiracy occurs is strong evidence that the target of the boycott has developed a viable business model.

57. As a second point, the correct frame of analysis for this question is the one I deployed in my opening report and utilize in this reply report. Would the overall value created by the entrant (through increased quality or decreased price) outweigh the costs of entering the market? If the answer is yes, then economics dictates that the parties in the transaction and/or service would figure out a way to allocate the costs among them to ensure the economic surplus is harvested. When the overall value outweighs the overall cost, the business model is viable. That is certainly the case for Uber and Lyft, and but for the conspiracy, the economic evidence shows it is the case for multilateral trading platforms like AQS as well.

58. Taxi companies would also undoubtedly say the entry of Uber and Lyft harms their economics and could cause them to *raise* prices. For example, the largely fixed costs of taxi dispatchers would be spread out over a smaller volume of taxi rides. This is analogous to Prof. Hendershott's "liquidity externality" argument. Such claims should be viewed skeptically, however. If taxi companies are pricing substantially above cost in the real world, there is likely enough anticompetitive "fat" in the system to be skimmed away once competition is introduced.

Highly Confidential

The decrease in that “fat” would likely more than offset any potential increased costs tax companies would face. In addition, as I detail below, applied to the facts of the stock loan market, the “liquidity externality” from the multilateral trading to OTC market is likely positive because dealers have a lower cost of hedging their exposures and sourcing liquidity from the platform. The positive liquidity effect reinforces the positive competition effect, leading to lower costs for clients overall.

III. MULTILATERAL PLATFORMS WOULD HAVE ENTERED THE STOCK LOAN MARKET

59. In Section II, I present my analysis showing that *if* multilateral platforms entered the stock lending market, *then* all or virtually all Class members would benefit, even those Class members did not actually use the platforms. In this section, I address the criticisms of Defendants’ experts regarding my analysis of why multilateral platforms would have entered in the absence of the conspiracy, bringing about those benefits to all or virtually all Class members in the stock lending market. My analysis consists of two components.

60. First, I explain that, contrary to Defendants’ view, there are no fundamental differences between platform and OTC loans. This means that platforms would be able to obtain a meaningful market share in the but-for world, generating the classwide benefits predicted by my economic search model. The differences raised by Defendants—primarily the theoretical possibility of implied “recall” or “rerate” protection that prime brokers build into the price of OTC stock loans—are overstated, and in any event these protections can be provided in the but-for world by broker-dealers sponsoring clients on platforms. That means that platforms in the but-for world would be a strong and workable competitor with the OTC segment, generating benefits for Class members in both.

61. Second, I explain that the cost of implementing a platform solution is lower than the bid-ask spread in the real-world OTC market. This means the platform can enter, undercut OTC prices, and gain market share. Defendants claim the costs would outweigh the benefits—which is hardly coherent given the robust demand and investment in platforms by major stock lending market participants—but nonetheless I detail below the economic reasons their analysis is mistaken.

A. There Are No Fundamental Differences Between Platform Loans and OTC Loans

62. A significant portion of Prof. Hendershott’s report is dedicated to his argument that stock lending exchanges have failed in the United States not because of Defendants’ conspiracy, but because “[s]tock lending is ill-suited to trading on a platform such as AQS.”⁴³ To support that argument, Prof. Hendershott sets up and then knocks down a strawman—namely that Professors Paul Asquith and Parag Pathak (“Prof. Asquith” and “Prof. Pathak”) and I “claim[] that anonymous platform trading would have largely or entirely replaced trading through prime brokers.”⁴⁴ The task that Prof. Hendershott thus sets for himself is evaluating whether platform trading in the but-for world likely would have eliminated or nearly eliminated stock lending through prime brokers.⁴⁵

63. But this is a false premise—I do not make any such claim about the but-for world. Rather, my opinion is merely that, “absent the conspiracy, anonymous multilateral platforms (including AQS itself) would have achieved sufficient scale to have marketwide impacts on all or virtually all Class members by, at the latest, January 1, 2012.”⁴⁶ As for quantifying the “sufficient scale” or “threshold scale” necessary to impact prices marketwide, Prof. Hendershott’s own research shows that the introduction to an OTC financial market of an electronic platform that obtains a market share of as little as 10% can generate substantial cost savings for investors, both on- and off-platform.⁴⁷ But Prof. Hendershott does not evaluate whether stock lending is sufficiently suitable for multilateral trading platforms to garner a market

⁴³ Hendershott Rpt. § IV.B.1; *see also id.* ¶¶ 14-22, 144-72.

⁴⁴ *Id.* ¶ 14.

⁴⁵ *See id.* ¶¶ 14-22, 144-72.

⁴⁶ Zhu Rpt. ¶ 93.

⁴⁷ Hendershott and Madhavan, *Click or Call? Auction versus Search in the Over-the-Counter Market*, 2015; Hendershott et al., *Do We Need Dealers in OTC Markets?* 2021.

share of 10% (or 20% or 30% or any reasonable estimate of the “sufficient scale” necessary to impact prices marketwide). He considers instead whether stock loans might possess attributes that would make it difficult for a platform to *dominate* the market,⁴⁸ a very different, and not very relevant, question.

64. In general, a central flaw of Defendants’ experts is that many of their arguments center on the possibility of losing features of the OTC market. But those features would not be lost—it is my view that a robust OTC segment would remain in the but-for world, preserving access to such features for those Class members that find them worthwhile. The key question from an impact perspective is whether those that remain OTC in the but-for world would be better off than they were in the real world. As my report, and in particular my search model, shows, the answer is yes.

65. This implies the only relevance of these “fundamental differences” arises if they are highly valued by such a large percentage of Class members that they cause the platform to be non-viable as an economic matter. For example, if *all* Class members wanted to enjoy relationship benefits on *all* trades, and therefore would never trade anonymously, then an anonymous platform could not achieve scale in the marketplace.

66. I analyze each of Defendants’ arguments below through that lens. To the extent these arguments have any merit—i.e., that the purported ancillary services are indeed valuable for some Class members—these arguments are fully addressed by allowing the relevant transactions to continue in the OTC segment in the but-for world, albeit at superior prices, *unless* Defendants establish particular ancillary services are so critical and widespread that they would inhibit platform entry altogether.

⁴⁸ See Hendershott Rpt. ¶¶ 14-22, 144-72.

67. I also note that for a number of these services, prime brokers would have an economic incentive to offer them *à la carte* in the absence of a conspiracy for platform loans too. Prof. Hendershott acknowledges that “*à la carte*” is a possibility.⁴⁹ For example, if locate services were required for platform loans, prime brokers would be willing to offer locate services to platform traders at the market-clearing price of locate services. After all, rational economic actors will always offer services provided the market-clearing price exceeds the cost of provision. Absent a conspiracy, prime brokers would be in direct competition and if a single prime broker refused to offer such services, its rivals would. That incentive would cause all prime brokers to offer unbundled services at the market-clearing price.

1. Recall Protection and Rerate Protection

68. Defendants’ experts have opined that platform-based loans are fundamentally different from OTC loans because OTC loans have recall and rerate protection features that cannot be replicated by platforms. For example, Prof. Hendershott claims “[a]n important service provided by prime brokers, but not available on a platform like AQS, is recall and re-rate protection and mitigation.”⁵⁰ Professor Justin McCrary (“Prof. McCrary”) claims that “[p]latform loans and OTC borrows are different products” because “[p]latform loans do not include the bundle of services that are included in the price of an OTC borrow.”⁵¹

69. I provide economic definitions of recall and rerate protection to provide clarity to both my analysis and Defendants’ experts’ critiques. As discussed in my opening report, a stock loan transaction creates a going concern—the borrower takes temporary control of the lender’s shares while providing periodic compensation for this privilege, and this trade will be unwound

⁴⁹ Hendershott Rpt. ¶¶ 347, 444.

⁵⁰ Hendershott Rpt. ¶ 62.

⁵¹ Expert Report of Justin McCrary § 2.2.1, ¶ 75, ECF No. 432-2 (“McCrary Rpt.”).

later. By default, both the borrower and lender can terminate the transaction at will. When a borrower terminates the loan, it is called a “recall.” When a lender terminates the loan, it is called a “return.”

70. Recalls, returns, and rerates are facts of the market, as mentioned in my opening report.⁵² It is plausible that some Class members in some circumstances would be interested in economic protection against these events happening. Specifically, recall protection provides the borrower, for a certain duration, protection against the possibility that a lender will “recall” the security (in whole or in part), terminating the loan before the borrower would like to end the loan. Return protection is the mirror image, constituting protection against the possibility that a borrower will return the security, terminating the loan before the lender would like to do so.

71. While recall and return protection prevent the *termination* of a loan, they do *not* prevent price changes. Thus, an entity purchasing recall protection could very well see the price of the loan change over time, even though the purchasing entity would have a legal guarantee that the loan would not be terminated.

72. Rerate protection is protection against the possibility that the loan rate (price) will change over time based on new supply and demand conditions. The purchaser of rerate protection has legal certainty that the agreed upon price (or loan rate) would not change for a certain duration.

73. As mentioned above, Defendants’ experts opine that these protections constitute fundamental differences between platform and OTC loans. But these differences are both overstated and irrelevant to my analysis of classwide impact. There are three reasons for this: (1) there is scarce evidence in the record that shows the presence and value of these purported

⁵² Zhu Rpt. ¶ 231.

protections; (2) these purported services are not offered for free, but sold in an opaque manner as a bundle in the OTC segment without any transparency of the cost of each item, and (3) any protections actually valued by class members could be available on the platform in the but-for world via explicit and transparent contractual terms.

74. As a final note, even assuming these protections had legitimate value *and* could not be provided by platforms in some circumstances, that would not alter my opinions on classwide impact. Class members needing custom versions of these services for particular transactions could continue to utilize the OTC segment, but at lower prices—my economic search model demonstrates even those participating in the “legacy” regime would be better off in the but-for world.

(a) *There is No Reliable Evidence of “Maturity Transformation Services” in the Stock Lending Market*

75. Defendants’ experts present no reliable economic evidence showing the Prime Broker Defendants provide meaningful recall, return, or rerate protection. Prof. Hendershott puts these services under the umbrella of “maturity transformation,” claiming that prime brokers provide “a valuable maturity transformation service by bridging the maturity mismatch between beneficial owners that need flexibility to recall their stock on demand, and short sellers that frequently need to hold an open short position for extended periods of time.”⁵³ He also claims that “prime brokers provide maturity transformation between beneficial owners and short sellers” that “cannot be replaced by trading on an anonymous platform like AQS.”⁵⁴

76. “Maturity transformation” is in general a banking term referring to the practice by banks of borrowing money on shorter timeframes than they lend money out. To my

⁵³ Hendershott Rpt. ¶ 81.

⁵⁴ *Id.* ¶ 124.

knowledge, this concept has not been used to describe the practices of prime brokers in the stock lending market. When asked at his deposition about applying this economic concept to the stock lending market, Prof. Hendershott [REDACTED]

⁵⁵ Prof. McCrary similarly testified that “[REDACTED]

”⁵⁶

77. Conceptually, “maturity transformation” is a misnomer in the stock loan context. In the original context of banking, the maturity of loans are months or years, whereas depositors are assured that they can withdraw anytime. There is a natural asymmetry. Such asymmetry is not obvious for stock loans. While stock lenders want the flexibility to recall shares anytime, stock borrowers also want to return the shares once the short trade fulfills its purpose, so they stop paying borrowing fees. Unlike the banking context, the relationship is symmetrical.

78. Defendants’ experts often conflate *rerate* protection and recall protection in their reports. For example, Prof. Hendershott claims “the literature shows that premature terminations of short positions due to recalls *or re-rates* are often costly, and the cost can vary significantly depending on a short seller’s trading strategy,”⁵⁷ even though the actual papers he cites only discuss recalls (but not recall protection).

79. While there is some limited anecdotal evidence of recall protection in the record, recall protection is of limited economic value as it is fairly easy for the prime broker to find alternative supply. On the other hand, *rerate* protection would be economically valuable, as it would shield stock borrowers from changes in price, but there is limited evidence in the record

⁵⁵ Hendershott Tr. 142:18-143:11.

⁵⁶ McCrary Tr. 324:24-326:9.

⁵⁷ Hendershott Rpt. ¶ 128 (emphasis added).

that it is provided by prime brokers at any time. By mixing the two together under the single umbrella of “maturity transformation services,” Prof. Hendershott masks the lack of reliable evidence from Defendants in support of rerate protection in favor of the sporadic anecdotal evidence they proffer in support of recall protection.

80. In general, Defendants’ economists have presented essentially no evidence of rerate protection. Prof. McCrary [REDACTED]⁵⁸ so I focus my analysis on Prof. Hendershott’s report.

81. Prof. Hendershott’s writes that [REDACTED]
[REDACTED]⁵⁹ He writes that “[REDACTED]
[REDACTED]
[REDACTED]”⁶⁰ He claims that the [REDACTED]
[REDACTED] “[REDACTED]
[REDACTED]” to the [REDACTED]
[REDACTED]⁶¹

82. Prof. Hendershott does not, however, present any methodology to quantify the amount of rerate protection (if any) that occurred. Nor does he purport to resolve his assertion

[REDACTED] Prof. Hendershott also testified that the

[REDACTED]
[REDACTED]⁶²

⁵⁸ McCrary Tr. 146:22-23 (“[REDACTED]”).

⁵⁹ Hendershott Rpt. ¶ 88.

⁶⁰ *Id.* ¶ 87.

⁶¹ *Id.* ¶ 88.

⁶² Hendershott Tr. 187:6-188:23.

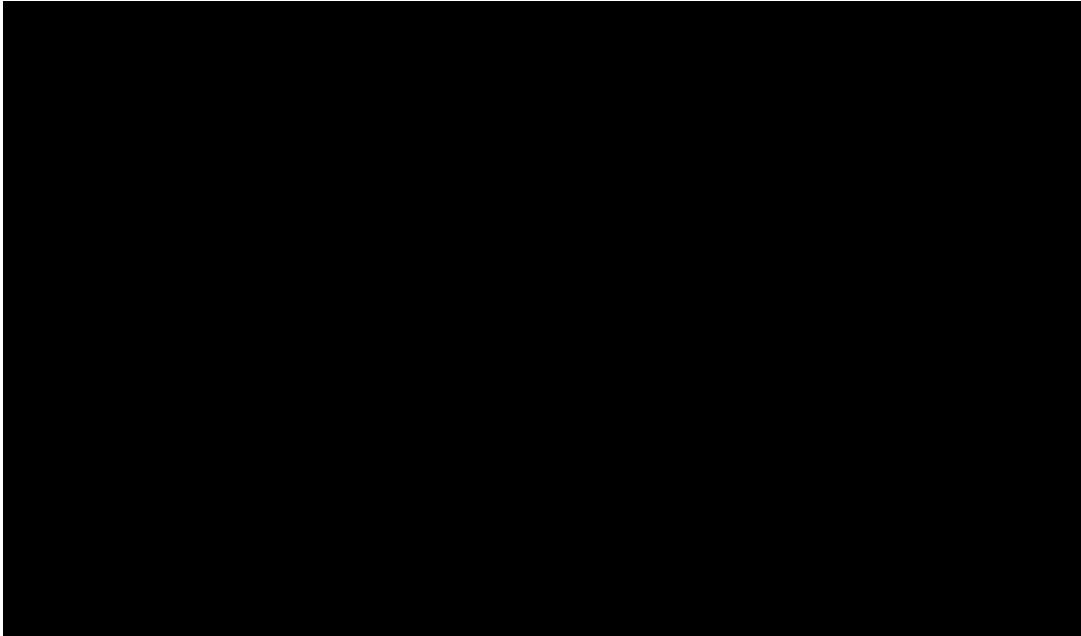
Highly Confidential

83. Prof. Hendershott's discussion of [REDACTED] is also highly misleading. The text of his report explains that "[REDACTED]

[REDACTED]

[REDACTED]"⁶³ He omits, however, that [REDACTED]

[REDACTED] Exhibit 6.A:



84. A straightforward review of Prof. Hendershott's [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] It is an uncommon practice in economic empirical analysis to emphasize the maximum or minimum of the data; instead, such outliers are often truncated or winsorized to make sure they do not have undue influence on the results.

⁶³ Hendershott Rpt. ¶ 88.

Highly Confidential

85. In Prof. Hendershott's [REDACTED] Exhibit 6.B of his report, he shows that [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

86. The fact that both sides of the market [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

87. When asked about [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

64

⁶⁴ Hendershott Tr. 194:20-195:13.

When asked for a definition of [REDACTED]

[REDACTED]⁶⁵ [REDACTED]

[REDACTED]⁶⁶

88. “Visual inspection” is not a rigorous econometric method. Behind the eyeball there must be rigorous econometric tests. Moreover, [REDACTED]

What about all other thousands of stocks over the entire Class Period? To show that rerate protection is present, one possible test would be to check if price changes on the “borrow” side are less than one-for-one than the price changes on the “lend” side. [REDACTED]

[REDACTED] not to mention on a larger sample of stocks and longer time periods. Prof. Hendershott’s academic studies on the corporate bond market and the stock market published outside the litigation context are much more rigorous.

89. Beyond the [REDACTED] example, Prof. Hendershott cites the Declaration of [REDACTED] who was the “[REDACTED]”⁶⁷

Before his time at [REDACTED] was the [REDACTED]

[REDACTED]⁶⁸ And the cited Declaration is not a contemporaneous document produced in the litigation, but is a Declaration submitted in support of Defendants’ class certification opposition.⁶⁹ The [REDACTED] Declaration is also vague and amorphous. For example, [REDACTED] claims that “[REDACTED]

⁶⁵ *Id.* at 173:6-175:10.

⁶⁶ *Id.*

⁶⁷ Hendershott Rpt. ¶ 87 n.156.

⁶⁸ [REDACTED]

⁶⁹ Declaration of [REDACTED] ECF No. 432-6 (“[REDACTED] Decl.”).

_____”⁷⁰ But _____ does not identify any specific examples of _____

For these reasons, this Declaration is not a reliable source of economic evidence.

90. Finally, when asked at his deposition for “

91. In contrast to his lack of reliable evidence supporting *rerate* protection, Prof. Hendershott does offer at least some limited anecdotal evidence supporting *recall* protection. For example, Prof. Hendershott cites to [REDACTED] testimony that “[REDACTED]

some documents from the record [REDACTED]⁷² He also cites

[REDACTED]⁷³ Still, this evidence is anecdotal and not supported by any empirical studies or other economic analysis.

92. In addition, *recall* protection on its own, without the ability to insulate Class members against price changes, has little economic value for Class members. In the OTC world, the prime brokers are the principals to the trade against end-user borrowers. If an agent lender recalls its shares, the shares are legally recalled from the prime broker, not the end-user borrower. Therefore, recall protection does not mean that the hedge fund borrower is protected from the share recall of an agent lender—these two parties are not linked directly in the OTC

⁷⁰ *Id.* ¶ 16.

⁷¹ Hendershott Tr. 170:19-171:19.

⁷² Hendershott Rpt. ¶ 308 (citing Deposition of [REDACTED]).

⁷³ *Id.* ¶ 64.

stock loan contract. Rather, recall protection means that the prime broker will find an alternative supply of shares to deliver to the agent lender that initiates the recall, i.e., protection against recall is merely about prime brokers substituting counterparties, shifting from a loan supplied by one entity to a loan supplied by another (assuming there is at least one lender willing to lend at *some* price). The economic costs of this substitution must be low, for otherwise the prime broker would not be in this business. And Prof. Hendershott himself explains, [REDACTED]

74

93. Prof. Hendershott's own academic sources also indicate recalls are "rare" in this market.⁷⁵ The study finds that agent lenders—at least the one under study there—rarely *initiated* recalls.⁷⁶ That means that there is little recall risk to protect borrowers from to start with. The rarity of recalls also confirms that it is in the economic interest of the agent lenders to keep the stock loans open to continue earning fees.

94. At his deposition Prof. Hendershott [REDACTED]

77 But Prof.

Hendershott misinterpreted the data studied in that paper, which did not analyze how often *borrowers* face recalls but rather how often *lenders* start them. Thus, the paper actually indicates whatever recall protection prime brokers provide has low value in most cases.

⁷⁴ *Id.* ¶ 63.

⁷⁵ Exhibit 5703 (Hendershott) at 303. The D'Avolio paper also explains that "[r]eturns earned during periods of involuntary or forced short covering in this sample are lower than average; this is evidence against widespread squeezes during this period in that short sellers can buy back shares at falling prices." *Id.* at 274. That means that Recall Protection would not have been particularly valuable in the data studied, because class members could readily "buy back shares at falling prices."

⁷⁶ *Id.* at 303.

⁷⁷ Hendershott Tr. 164:8-165:15.

(b) *The Reputation-Based OTC Regime Is an Inferior Way to Provide Recall and Rerate Protection*

95. In the previous section, I analyzed the economic evidence proffered by Defendants’ experts in support of alleged “recall” and “rerate” protections and found it to be thin and unreliable. Even if these protections did exist and were valued, the way they are sold in the prevailing identity-based OTC world is opaque, inefficient, and ultimately harmful for Class members.

96. When protections are included via firm contractual terms, it is clear to all parties involved what is getting sold and at what price. That ensures that Class members can purchase precisely the protections they want and can rely on the contractual promises to ensure their expectations are being met.

97. The prevailing OTC world does not have such contractual transparency. Instead, according to Defendants’ experts, these protections are paid for as part of the price of the loan in an opaque manner. For example, Prof. Hendershott claims “

_____”⁷⁸ and that “_____

_____”⁷⁹ He

also claims “_____

_____”⁸⁰

98. When everything could be part of an implicit arrangement that is not written down and therefore cannot be verified ex post, prime brokers gain substantial power in arbitrarily

⁷⁸ Hendershott Rpt. ¶ 54.

⁷⁹ *Id.* ¶ 62.

⁸⁰ *Id.* ¶ 150.

Highly Confidential

dictating how end users are treated and giving arbitrary reasons why end users are not offered good prices. What would benefit Class members is the opposite: transparency into what they are paying for and from whom. End users currently lack any means to ascertain this information reliably. Prof. Hendershott's [REDACTED]⁸¹

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

99. If Defendants' primary economist [REDACTED]

[REDACTED] it is doubtful actual class members are faring any better in the real world. And his proposed solution, as vague as it is, would involve very high search costs, requiring Class members [REDACTED]

[REDACTED]

⁸¹ Hendershott Tr. 179:24-181:12.

██████████⁸² Obviously, the prime brokers could have just told clients the unbundled prices to save everyone's time and effort, but they do not.

100. If these services were truly valuable and sought by Class members, they would be better off if these protections could be paid for at firm prices backed by contractual commitments. The contractual commitment can be as simple as “if you pay x bps more for borrowing the stock, we will not recall on you.” If the end-user borrower’s value for not being recalled exceeds x bps, it would purchase this protection. If not, it would not. By bundling recall protection into the transaction, end-user borrowers are forced to purchase it even if it is not valuable at all.

(c) Any Protections Valued by Class Members Can Be Implemented on the Platform in the But-For World

101. As discussed above, to the extent Class members *do* value recall or rerate protection, those protections would be more efficiently provided in the but-for world, either through platform technology or firm contractual terms.

102. Turning to platform technology, Prof. Hendershott conflates what AQS did in the real world for what a rational platform could do in the but-for world. Specifically, Prof. Hendershott claims “[a] platform like AQS does not perform the maturity transformation function that prime brokers provide because it must [REDACTED]

⁸³ This is not the only solution. For example, the Indian Stock Lending Exchange discussed *infra* has an alternative design in which the party initiating the recall sends a borrow request to the system. *See infra* Section V.B.1.c. Because shares are fungible with central

82 *Id.*

⁸³ Hendershott Rpt. ¶ 133.

clearing, the party initiating the recall does not care where the shares come from: an existing borrower or a new lender. *Id.*

103. On AQS itself, [REDACTED] described “[REDACTED]
[REDACTED]
[REDACTED]”⁸⁴ In that context, he explained how the “[REDACTED]
[REDACTED]” and that the
[REDACTED]⁸⁵ With respect to
recall and rerate protection, [REDACTED] also stated in his declaration that “[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]”⁸⁶

104. Thus, to the extent that “maturity transformation” means providing recall protection as a technological solution, a multilateral electronic trading platform could readily do so.

105. Another way that anonymous multilateral trading platforms can offer recall protection is via explicit contractual terms. Many financial products involve ongoing and future promises and commitments, including options, futures, and swaps. As an economic matter, recall and rerate protection could likewise be accomplished in the stock lending market through standardized, firm contractual terms that would be associated with stock loans on platforms.

84 [REDACTED]

85 *Id.*

86 [REDACTED] Decl. ¶ 14.

106. Defendants have claimed there [REDACTED]

[REDACTED]⁸⁷ If true, such loans are economically equivalent to term loans with contractual recall and rerate provisions. Platforms can also offer term loans and enable the short seller to shop for the best price for these types of arrangements.

107. For example, the platform could introduce standardized stock loan contracts that say “no recall or return within X days, after which it is open,” where X is a parameter that can be set to be, say, 0 days (conventional open contract), 7 days, 14 days, 21 days, and 28 days, etc. If a hedge fund believes that the typical time horizon for its shorting trade to make profit is two weeks, then it could use the 14-day contract. If a stock lender knows that it would not need the shares back until one week later, it could enter the 7-day contract. To the extent that there is supply and demand imbalance across the contracts, prime brokers and proprietary trading firms can provide liquidity, bear a small basis risk, and earn an expected profit as compensation. For example, if stock borrowers want to keep the shares for 14 days and stock lenders can only commit 7 days, a liquidity provider can act as the counterparty to both the lender and the borrower and take on the risk that the lender recalls the shares between day 8 and day 14. This pair of trades would earn the liquidity provider a positive expected profit. In the futures market, that strategy is known as a calendar spread, i.e., long (buy) an oil contract of one maturity and short (sell) an oil contract of another maturity. If demand and supply imbalances swing the other way later, the liquidity provider can unwind the original position.

108. In addition to providing recall protection, a valuable function fulfilled by a set of standardized contracts is that the price differential reveals the true market value of any recall protection. For example, suppose the best offer of a conventional open contract for borrowing a

⁸⁷ See, e.g., Declaration of [REDACTED] ¶¶ 17-22, ECF No. 432-14 (“[REDACTED] Decl.”).

stock is 100 bps and the best offer on the contract with a 7-day no recall/return provision is 102 bps, then the market value for the 7-day commitment is 2 bps (102 – 100). If, in addition, the best offer on the contract with a 14-day no recall/return provision is 103 bps, then the market value for committing to the trade between day 8 and day 14 is 1 bp (103 – 102). Equipped with these estimates, made possible by the pre-trade transparency of platforms or post-trade transparency of reporting, end users can better judge whether the recall protection they purchase from prime brokers are worthwhile.

109. Prof. Hendershott claims that “some lenders may face restrictions on their ability to offer long-term loans.”⁸⁸ He does not cite any particular restrictions in his report. And the one citation he does have states “for passive funds which are aware that they will hold an asset for a longer period of time, *it may be possible to utilize this certainty to provide term options to borrowers.*”⁸⁹ Thus, at a minimum, some lenders would be able to execute term loans, with rerate and/or recall protection for the duration of loans, as long as there is demand for them.

2. *Other Purported Benefits of OTC Transactions*

110. In addition to recall and rerate protection, Prof. Hendershott presents several other purported benefits of OTC transactions that will disappear in the but-for world. I address each of these below.

(a) Locate Services

111. One of the alleged prime broker services included in Prof. Hendershott’s “interrelated bundle of services” is “locates” for stock.⁹⁰ With a “locate” in hand, the short seller

⁸⁸ Hendershott Rpt. ¶ 34.

⁸⁹ Peter Bassler & Ed Oliver, *Securities Lending Best Practices: A Guidance Paper for Institutional Investors* 10 (2015), https://www.esecclending.com/wp-content/themes/klasik-child/pdfs/eSecLending_Securities_Lending_Best_Practices.pdf (emphasis added).

⁹⁰ Hendershott Rpt. ¶ 60.

can execute a short sale transaction *even if* the short seller has not yet borrowed stock.⁹¹ Specifically, a broker effectuating a short sale must ensure that either (1) the broker has “[b]orrowed the security, or entered into a bona-fide arrangement to borrow the security” or (2) the broker has “[r]easonable grounds to believe that the security can be borrowed so that it can be delivered on the date delivery is due.”⁹² This second option allows the short seller to sell *before* a stock has been borrowed provided that the broker has some “reasonable grounds” to believe that the stock can be borrowed before settlement, which typically occurs within a few days.⁹³

112. The locate requirement can be satisfied in the but-for world as well. As discussed before, end users who prefer to remain OTC can do so, and the locate service remains part of the bundle they get in the OTC segment. End users that wish to switch to the platform can purchase the same locate service, as a bundle or *à la carte*, from their clearing sponsors, who are also broker-dealers. Because platform trading allows conventional stock borrowers (e.g., hedge funds) to lend their fully paid longs, I expect that satisfying the locate requirement in the but-for world would be easier than in the actual world. Relatedly, AQS had proposed a “[REDACTED]” that would [REDACTED]

[REDACTED]⁹⁴ I do not see any significant economic roadblocks to ensuring market participants would be able to satisfy any locate needs in the but-for world.

113. As a final point on locates, Defendants have argued that certain Class members receive “preferential access” to locates. The supposed benefit is that supply is scarce, so some

⁹¹ 17 C.F.R. § 242.203.

⁹² 17 C.F.R. § 242.203(b)(1)(i)-(b)(1)(ii).

⁹³ *Key Points About Regulation SHO*, U.S. Securities and Exchange Commission, <https://www.sec.gov/investor/pubs/regsho.htm> (Apr. 8, 2015); 17 C.F.R. § 242.204.

⁹⁴ [REDACTED]

Class members are given preferential access to supply. But there is no reason to expect the supply to be as scarce in the but-for world. Once platform trading gains traction, spread compression will happen, i.e., stock lenders will receive more and stock borrowers will pay less. This means more supply will come to the market, and the transparency brought by the platform makes it easier to find the supply. Any difficulty to locate shares reflects the problem of the current market structure, not its virtue. Moreover, to the extent that any Class member did have genuine preferential access—for example a trove of stock lending supply in the exclusive possession of a certain prime broker—the Class member could maintain that preferential access by continuing to partake in the OTC segment.

(b) Information Leakage

114. Prof. Hendershott claims “ [REDACTED]

[REDACTED]

[REDACTED]”⁹⁵ His argument does not show that information leakage is worse in the but-for world than in the actual world.

115. First, prime brokers can leak information as well. The paper Prof. Hendershott cites discusses the adverse information impacts a client faces when dealing with intermediaries like the prime brokers. The paper explains that “if a large hedge fund invested more than \$500M in a given security that was thinly traded, and *the market maker in this security knew of this position*, then the market maker could easily work against the manager.”⁹⁶

⁹⁵ Hendershott Rpt. ¶ 166.

⁹⁶ See James R. Hedges IV, *Hedge Fund Transparency*, 11 Eur. J. Fin. 411, 413 (2005) (emphasis added).

116. Second, investors are experienced in designing trading strategies that minimize information leakage. Presumably, the scenario that Prof. Hendershott had in mind is that stock loan transactions are reported, from which the market may learn about a large transaction. However, end users do not have to enter a large transaction in one go. In the U.S. stock market, splitting up a large order into smaller pieces is a standard practice. Prof. Hendershott discusses “quasi-front running,” which are relevant if sophisticated strategic traders can somehow detect a lurking large order behind a series of small ones. In my own research on back-running, fundamental investors can reduce information leakage effectively by adding random noise to their order flow.⁹⁷

117. Granted, it is difficult to fully eliminate information leakage risk for extremely large orders. But the correct frame of inquiry is how platform trades compare to OTC trades. In an OTC trade, a single prime broker typically cannot absorb the entire large order, and the prime broker’s action to work the order for the client has the same information leakage problem. Put differently, by trading a large order OTC, the end user does not solve the information leakage problem, but merely outsources this problem to the prime broker. The prime broker will, of course, charge a premium for bearing that risk. Therefore, it is not obvious at all that trading OTC is a better strategy for the end user. In the U.S. stock market, a large order is sometimes sold to prime brokers as a block, sometimes executed piecemeal, and sometimes matched against another natural institutional buyer or seller with the opposite trading intention. The first option is still available in the but-for world in the OTC segment, and the second and the third options are only available if end users can trade on platforms or trade directly with other end users—options

⁹⁷ Liyan Yang & Haoxiang Zhu, *Back-Running: Seeking and Hiding Fundamental Information in Order Flows*, 33 Rev. Fin. Stud. 1484, 1486 (2020) (“[F]undamental investors’ optimal strategy is to add endogenous, normally distributed noise into their period-1 orders.”).

unavailable in the real world. Therefore, the but-for world gives end users more options to limit information leakage.

118. The third reason that information leakage concerns are overstated in Prof. Hendershott's report is that he confounded trade reporting with position reporting—two vastly different concepts.⁹⁸ He first cites the deposition of a [REDACTED] executive, [REDACTED] who said “[REDACTED] [REDACTED]”⁹⁹ But that is a strawman. Pre-trade transparency is about showing prices and quantities available, not identities of those behind the orders; post-trade transparency is about reporting traded prices and quantities (sometimes with a cap), not identities of those who execute the trades. As a market convention, identities of traders are hidden in the trading process in the vast majority of countries, including the United States. The only exception I am aware of are the Nordic countries. Certain SEC rules require large institutional investors (including hedge funds) with assets under management above \$100 million to report their positions quarterly, which is much less frequent than daily. The quote from [REDACTED] [REDACTED] therefore, rings vacuous. Prof. Hendershott also cites the testimony from [REDACTED] executive [REDACTED]¹⁰⁰ While [REDACTED] was testifying about [REDACTED] it used largely the same strawman. Data aggregators use prices, not identities. Prof. Hendershott's cite of a comment letter from the Security Traders Association of New York, Inc.¹⁰¹ has the same problem that I shall not repeat.

⁹⁸ The paper *Hedge Fund Transparency* authored by James Hedges is irrelevant for a similar reason. That paper relates to disclosing the positions of hedge funds, which is orthogonal to price transparency issues that arise on trading platforms. See, James R. Hedges IV, *Hedge Fund Transparency*, 11 Eur. J. Fin. 411, 413 (2005).

⁹⁹ [REDACTED] Tr. 78:14-20.

¹⁰⁰ Hendershott Rpt. ¶ 172.

¹⁰¹ *Id.*

119. Overall, Prof. Hendershott expressed concerns about information leakage, but that challenge exists not just on a platform but also in OTC markets. If anything, the world with the platform gives end users more options to mitigate information leakage. Let me emphasize again that pre-trade and post-trade transparency on platforms is about showing prices, not identities of end users.

(c) Relationship Benefits & Favorable Pricing

120. Listing another purported benefit of the prevailing market structure, Prof. Hendershott claims that “[REDACTED]”
 [REDACTED]
 [REDACTED]”¹⁰² Prof. Hendershott also observes “[REDACTED]”
 [REDACTED]
 [REDACTED]”¹⁰³ The presence of price discrimination, however, does not imply Class members are getting a good deal. As explained by the Nobel-Prize Laureate George Stigler, “[p]rice dispersion is a manifestation — and, indeed, it is the measure — of ignorance in the market.”¹⁰⁴ It does not surprise me at all that in the existing OTC market Class members receive a widely dispersed set of quotes, even at the same time, given the opacity of the market and lack of sufficient competition.

121. Prof. Hendershott offers several hypotheses about why price discrimination occurs for reasons other than anticompetitive market structure. He first claims “[REDACTED]”
 [REDACTED]

¹⁰² *Id.* ¶ 24.

¹⁰³ *Id.* ¶ 50.

¹⁰⁴ George Stigler, *The Economics of Information*, 69 J. Pol. Econ. 213, 214 (1961).

Highly Confidential

██████████”¹⁰⁵ He next claims “██████████
 ██████████” and that “██████████
 ██████████”¹⁰⁶ These arguments are
 circular. Lending arrangements are the result of market structure, not the cause of it. For
 example, the prime brokers may structure lending arrangements with varying minor details so
 that price comparison is difficult.

122. Prof. Hendershott also cites a ██████████ employee who testified that “██████████
 ██████████
 ██████████”¹⁰⁷ But for counterparty risk to have a material impact on pricing,
 default must be real in the data, not just a fear. Prof. Hendershott did not offer any evidence on
 the possibility of counterparty default. Additionally, the introduction of a CCP standardizes the
 use of collateral and obviates counterparty risk. If market participants are worried about default
 risk, then there would be strong demand for a CCP solution for stock loans.

123. Prof. Hendershott also cites to an ██████████
 document for the proposition that “██████████
 ██████████”¹⁰⁸ The basis for ██████████ observation was the
 “██████████” notably that ██████████
 ██████████
 ██████████”¹⁰⁹ But again, the type of trading mechanism used is an outcome of market structure.
 It is also fully consistent with a conspiracy. If the Prime Broker Defendants were conspiring

¹⁰⁵ Hendershott Rpt. ¶ 52.

¹⁰⁶ *Id.* ¶ 53.

¹⁰⁷ *Id.* ¶ 53 n.74.

¹⁰⁸ *Id.* ¶ 53.

¹⁰⁹ ██████████ at ‘2295.

against the introduction of multilateral trading, it is not surprising that they avoided using multilateral trading.

124. Prof. Hendershott next discusses how collateral reinvestment strategy might indicate some beneficial owners could be willing to accept lower prices in exchange for higher utilization—allowing them to earn more reinvestment income from collateral.¹¹⁰ That is a curse rather than a blessing. If trades could occur between end users with minimal dealer intermediation, prices would improve for both end-user borrowers and end-user lenders, i.e., a spread compression. Demand from end-user borrowers would go up, and utilization for lenders could improve as well. In that case, end-user lenders get both a better price and a higher quantity of loans, leading to an unambiguous better outcome in the but-for world. The choice between price and quantity is artificial; end users can have both outcomes improved absent conspiracy.

125. Prof. Hendershott claims “[s]ome of this price dispersion is not random” and that “[REDACTED]”¹¹¹ Presumably, prime brokers determine which Class members get better prices based on their identities, which are observable. Usually, price dispersion is interpreted empirically after conditioning on observable information, that is, prime brokers’ price offers to clients with similar observable characteristics resemble a probability distribution. In addition, what matters is whether each Class member gets a better price in the but-for world than they did in the real world. For example, a Class member that received favorable pricing because of its longstanding relationship with a prime broker would also get favorable pricing in the but-for world due to that longstanding relationship—the

¹¹⁰ Hendershott Rpt. ¶¶ 55-58.

¹¹¹ *Id.* ¶ 332.

price would just be better due to increased transparency and strengthened client bargaining power. I have shown this in the context of my search model.

126. Prof. Hendershott claims “the presence of a platform would have reduced this price dispersion and [REDACTED] [REDACTED]”¹¹² Prof. Hendershott also states that “it is likely that at least some class members would have obtained worse prices in the but-for world than those they incurred in the actual world.”¹¹³ These claims are incorrect and reflects a serious misunderstanding (or misrepresentation) of search models. “Favorable” is relative and not absolute. A relatively “favorable” price in an OTC market often looks awful in a competitive one. As I explained in my opening report, the introduction of the platform reduces search costs and improves the prices for all end users. Those who receive favorable prices in the OTC world get even better prices in the but-for world. And those who receive bad prices in the OTC world also get improved prices in the but-for world.

127. Prof. Hendershott is also incorrect in implying that I assume “all transactions would have occurred at a common ‘platform price’ plus or minus a narrow range of associated fees.”¹¹⁴ That is not the case. In my economic search model, [REDACTED]

[REDACTED]¹¹⁵ [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

¹¹² *Id.* ¶ 334.

¹¹³ *Id.*

¹¹⁴ *Id.*

¹¹⁵ Zhu Rpt. ¶¶ 286-87 (showing “but-for” probability distributions).

Again, Prof. Hendershott conjectured a but-for world that is dominated by platforms, but it is not the but-for world I described in my opening report. If platforms dominate, then the search model predicts that prices converge to the competitive level, i.e., zero spread.

128. Prof. Hendershott’s misinterpretation of the but-for world is illustrated by his “simple example” that is supposed to show why price dispersion could be to the benefit of some Class members.¹¹⁶ In his simple example, the hypothetical short seller receives a price that is “40 bps points [*sic*] better than the average loan price” yet the “average price improved by 20 bps” in the but-for world.¹¹⁷ Thus, according to Prof. Hendershott, the Class member is not injured because their but-for world price is higher than the price paid in the actual world.¹¹⁸ This hypothetical is deeply flawed and underscores the flawed assumptions I highlighted above. Prof. Hendershott wrongly assumes *convergence to the average price* in the but-for world. As I described in my opening report and above, prices improve for all end users when multilateral trading is introduced. In the limit, if multilateral trading takes 100% of the market, the prices will converge—not to the average price in OTC market, but to the full competitive price level. In any case, regardless of whether multilateral trading takes over a small or a large part of the market, price convergence to the average does not happen.

129. As a final point, Prof. Hendershott claims the “existence of relationship benefits in name-disclosed OTC markets is well documented,” citing a variety of economic papers and other evidence.¹¹⁹ Many economic studies point the other way, however.

¹¹⁶ Hendershott Rpt. ¶ 335.

117 *Id.*

118 *Id.*

119 *Id.* ¶ 141.

130. For example, Hau, Hoffmann, Langfield, and Timmer (2020) use supervisory data from the European Central Bank to study discriminatory trading in foreign exchange markets. Their data contain the identities of dealer banks and their clients, as well as the identities of the trading venues (including OTC). The data cover FX forward contracts executed from April 2016 to March 2017. Their abstract states:

“The median client pays 10.9 pips [one pip is \$0.0001] more than blue-chip companies due to its lower level of sophistication, which compares with a sample average effective spread of 6.9 pips. However, price discrimination is fully eliminated when clients trade electronically on multi-dealer platforms. We also document that less sophisticated clients incur additional costs when trading with their relationship bank and in fast-moving markets, but only for bilaterally negotiated contracts.”¹²⁰

131. The authors’ find that most clients who trade with their “relationship” dealers pay higher transaction costs, suggesting that relationships can be captive.¹²¹

132. While Prof. Hendershott cites one of my papers on the Index CDS market that says “customer-dealer relationships play a role in index CDS markets,” the same paper finds no statistical difference between price quotes from “relationship” dealers and non-relationship dealers, i.e., relationship does not lead to better prices.¹²²

133. Similarly, my paper entitled “Finding a Good Price in Opaque Over-the-Counter Markets” does not express the viewpoint that OTC markets are always a preferred trading structure for the market—it similarly starts from the *assumption* that the OTC market is in place

¹²⁰ Hau, Hoffmann, Langfield, and Timmer, 2020, “Discriminatory Pricing of Over-the-Counter Derivatives,” Management Science (forthcoming). Available at http://www.haraldhau.com/wp-content/uploads/FX_PriceDiscrimination_v340.pdf.

¹²¹ *Id.*

¹²² Lynn Riggs, Esen Onur, David Reiffen, & Haoxiang Zhu, *Swap Trading After Dodd-Frank: Evidence from Index CDS*, 137 J. Fin. Econ. 857, 861 (2020) (“However, we do not find evidence that clearing relationships or past trading relationships have a significant impact on transaction costs.”).

and studies the economic implications of searching within OTC markets.¹²³ Contrary to Prof. Hendershott's incorrect inference, "salient features" are not always literally features.¹²⁴ As an analogy, homelessness is a salient feature of some cities, but it is not a cause for celebration. To the contrary, at least for the stock lending market in this case, adding the option of a multilateral trading venue to the market would benefit all Class members by shifting some activities from the "salient" (but uncompetitive) OTC market to platform trading, as shown in my opening report.¹²⁵

134. In sum, relationships have dubious values to end users at best. Even if some investors derive positive value from it, they can continue to do so in the but-for world by staying in the OTC segment. The only difference is that they would do so at better prices due to competition and are therefore impacted.

3. *Stock Loans Are Highly Standardized and Would Trade at Sufficient Volumes to Enable Platform Trading*

135. Prof. Hendershott tries to support his position that "[s]tock lending is ill-suited to trading on a platform such as AQS,"¹²⁶ with two additional arguments: (1) "stock loans are not naturally standardized" and (2) stock loans are "infrequently traded."¹²⁷ These arguments fail. Prof. Hendershott's key omission is that contract design and trading behavior are not carved in stone; rather, they are *consequences* of market structure.

136. Common economic evidence shows that stock loans are sufficiently standardized to enable platform trading. Prof. Hendershott himself does not dispute that "[s]tock loan documentation is highly standardized" or that "[e]ach stock loan uses a Master Securities

¹²³ Hendershott Rpt. ¶ 142 (citing Haoxiang Zhu, *Finding a Good Price in Opaque Over-the-Counter Markets*, 25 Rev. Fin. Stud. 1255, 1257-58 (2012)).

¹²⁴ *Id.* ¶ 142.

¹²⁵ *See, e.g.*, Zhu Rpt. ¶¶ 81-345.

¹²⁶ Hendershott Rpt. § IV.B.1.

¹²⁷ *Id.* ¶ 18; *see also id.* ¶¶ 144-72.

Lending Agreement (‘MSLA’), which provides uniformity across transactions and establishes the legal rights and obligations of the parties to the transaction.”¹²⁸ Prof. Hendershott argues that this form of standardization is irrelevant because “as trades with different counterparties using the same loan contract will generate different risks if, for example, one counterparty is more likely to recall the loan than another.”¹²⁹

137. To see why this argument is incorrect, consider the U.S. stock market, which Prof. Hendershott, I, and almost everyone else view as standardized. Between trading and settlement, there are two days of delay. To use Prof. Hendershott’s logic, the U.S. stock market must be non-standardized because one counterparty is more likely to fail to deliver the stock than another, isn’t it? The answer is that a clearinghouse, DTCC in the U.S. stock market case, stands between the two counterparties and insulate each other from delivery failures. Likewise, once a platform and CCP are introduced in the U.S. stock loan market, the legal counterparty of end users on both sides becomes the CCP. If recall happens, the platform and the CCP can treat the recall as a request to borrow, which insulates the borrowers from recall risk. That mechanism is implemented in India, as I discussed above. In addition, recall and rerate protection can also be built into stock loan contracts explicitly for such features.¹³⁰ I already discussed one possibility: open contracts with recall/return restriction for X days.

138. Prof. Hendershott points out that there may be cases where Class members have truly esoteric needs that cannot be addressed using contracts of standardized maturities. For example, perhaps a platform only has recall protection available in 15-day or 30-day increments, but a certain Class member needs precisely 20 days of recall protection. In this case, the Class

¹²⁸ *Id.* ¶ 150 n.293 (quoting Amended Complaint ¶ 109, ECF No.73).

¹²⁹ *Id.*

¹³⁰ *See supra* Section III.A.1.c.

member would compare the prices of the standardized platform contracts and the tailored OTC contracts and decide if the specific need justifies the price differential. For example, suppose the best prices to borrow with 15-day and 30-day recall protection are 100 bps and 103 bps, respectively. If a dealer quotes a price of 105 bps for a contract with 20-day recall protection, the end user should just use the platform contract that has 30-day recall protection: it has strictly longer protection period and a cheaper price. If recall protection has value, and because $15 < 20 < 30$, it is straightforward to see that the fair market price for the contract with 20-day recall protection should be between the prices of contracts with 15- and 30-day recall protection, i.e., between 100 bps and 103 bps. Put differently, the platform prices put a strong price discipline, or price bounds, on the OTC prices of slightly different contracts. The availability of standardized contracts provides valuable price information, so end users who opt for nonstandard contracts are also better off. The way standardized contracts and nonstandard ones complement each other is consistent with the very economic literature that Prof. Hendershott relies on for his argument.¹³¹

¹³¹ See Hendershott Rpt. ¶ 147 n.284 (quoting René M. Stulz, *Credit Default Swaps and the Credit Crisis*, 24 J. Econ. Perspectives 73, 88 (2010) for the proposition: “Exchanges create pools of liquidity by standardization—they have few contract types trading. With this standardization, investors and firms give up the opportunity to obtain a contract that exactly fits their needs for the benefit of trading in a liquid contract.” And quoting Michael Fleming et al., *An Analysis of OTC Interest Rate Derivatives Transactions: Implications for Public Reporting* 2-4 (2012) for the proposition: “The over-the-counter (OTC) derivatives markets provide a venue for market participants to transact in flexible and customizable contracts [...] Privately negotiated trades, known as over-the-counter or OTC trades, allow parties to customize features of the derivative to serve the specific needs of the users [...] By contrast, exchange traded contracts are more standardized.”); Hendershott Rpt. ¶ 149 n.288 (quoting Richard Heckinger et al., *Understanding Derivatives: Markets and Infrastructure* 27, 31 (2013) for the proposition: “For exchange-traded futures and options contracts, terms are standard and negotiable only with respect to price and quantity. OTC transactions, by contrast, involve contracts that are uniquely designed to manage a specific risk... The primary reason to use an OTC contract, as opposed to an exchange-traded contract, is to create a ‘perfect’ hedge.”).

139. Prof. Hendershott also claims platforms would suffer from an “adverse selection” problem because only traders with a high rate of recall or rerate behavior would be interested in trading anonymously.¹³² But as discussed *supra*, platforms would be able to implement recall protection as the market demands by introducing contracts that freeze out recalls for a period of time.¹³³ As discussed before, the evidence of rerate protection is very thin, but if there is sufficient demand, contracts with rerate protection can also be introduced. For example, a contract with rerate protection (but not recall protection) could say “the lending fee on this contract is fixed for 7 days or until recall/return happens, whichever is sooner.” A contract with both recall and rerate protections could say “this stock loan cannot be recalled, returned, or rerated for 7 days, after which it becomes open for all these actions.” Again, let me return to the point that contract design is a consequence of market structure. If, as Prof. Hendershott argues, platform trading attracts traders with quick recalls, returns, and rerates, and if such behavior is deemed “adverse” to markets, new contracts can be introduced to change the behavior. Holding the contracts fixed while the market structure changes is like having the tail wag the dog.

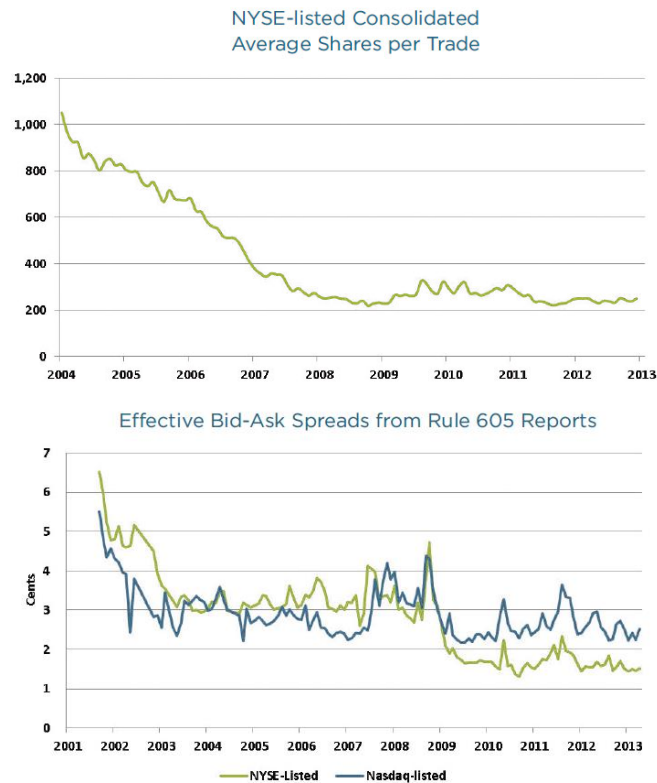
140. Having discussed the contract features of stock loans, let me turn to liquidity. The U.S. stock loans market has sufficient volume to enable platform trading. As a first point, Prof. Hendershott wrongly assumes that observed real-world trading volumes are an appropriate proxy for but-for world trading volumes, claiming for example that “[REDACTED]” (Exhibit 14).¹³⁴ Prof. Hendershott’s logic is circular: trading frequency and trade sizes are often *a result of market structure* rather than a cause. In the U.S. equity market, for example, technology advancements

¹³² See Hendershott Rpt. ¶¶ 153-55.

¹³³ See *supra* Section III.A.1.c.

¹³⁴ Hendershott Rpt. ¶ 191.

in the 2000s have reduced transaction costs and trade sizes, as shown in the following two charts taken from Angel, Harris, and Spatt (2013):¹³⁵



141. The top chart shows that from 2004 to 2013, the average trade size of NYSE-listed stocks declined from 1000 shares to 200 shares. The bottom chart shows that effective bid-ask spread, a commonly used measure of bid-ask spreads, declined from about 3 cents in 2004 to 1.5 cents in 2013 for NYSE-listed stocks. These data clearly show that the way investors trade is not carved in stone; it adjusts to market developments. I expect that once the stock loan market becomes more competitive, a similar development would materialize: smaller trade sizes, more frequent trades, and narrower bid-ask spreads.

¹³⁵ See James J. Angel et al., *Equity Trading in the 21st Century: An Update* 7, 15 (2013), <https://www.q-group.org/wp-content/uploads/2014/01/Equity-Trading-in-the-21st-Century-An-Update-FINAL.pdf>.

142. Relatedly, Prof. Hendershott argues that U.S. stock loan markets are not too liquid. According to his Exhibit 13, [REDACTED]

[REDACTED]¹³⁶ While the intended message of Prof. Hendershott is that the U.S. stock loan market is not large enough to trade on platforms, the data show the opposite.

143. To put the numbers into perspective, [REDACTED]
[REDACTED], comfortably exceeds the total stock market trading volume of almost any other country, and we know that exchanges are the dominant trading venues of stocks around the world. The following table, produced using statistics from the World Bank, shows the yearly trading volume of top ten non-U.S. markets ranked by trading volume in 2012.¹³⁷ I added a row for the trading volume in the U.S. stock loan market, [REDACTED]

[REDACTED] Only China (mainland) and Japan stock markets are larger than U.S. stock loan market, whereas UK stock trading volume is comparable to it. [REDACTED]
[REDACTED] than the entire stock market trading volume in Korea, Canada, Germany, Hong Kong SAR, France, Australia, Spain, and of course any other country ranked lower. Given that stock exchanges are the dominant trading mechanism globally, the U.S. stock loan market is large and liquid enough to be traded on exchanges.

¹³⁶ See also Hendershott Rpt. ¶ 165.

¹³⁷ See *Stocks Traded, Total Value (Current US\$)*, The World Bank, https://data.worldbank.org/indicator/CM.MKT.TRAD.CD?most_recent_value_desc=true (last visited Sept. 30, 2021).

Year Stock Trading Volume, trillion USD	2012	2013	2014	2015	2016	2017
China	5.0	7.7	12.0	39.3	18.3	17.2
Japan	3.3	6.1	4.8	5.6	5.2	5.8
United Kingdom	2.5	1.7	2.4	missing	missing	missing
██████████	████	████	████	████	████	████
Korea	1.6	1.3	1.3	1.8	1.6	2.0
Canada	1.3	1.3	1.3	1.1	1.2	1.3
Germany	1.2	1.3	1.3	1.4	1.1	1.6
Hong Kong SAR, China	1.1	1.3	1.5	2.1	1.4	2.0
France	1.1	1.1	1.2	missing	missing	missing
Australia	0.9	0.8	0.7	0.8	0.8	0.8
Spain	0.9	0.9	1.0	1.0	0.6	0.7

144. I also note that Prof. Hendershott’s “infrequent and large” critique again relies on the false premise that platforms would dominate the market in the but-for world. For example, Prof. Hendershott points out that his “research on the behavior of NASDAQ market makers has revealed that because of their long-term relationships with brokers, NASDAQ market makers are able to execute large trades at prices that would not be feasible on the anonymous platform.”¹³⁸ That research clearly does not show, however, that stocks could *never* trade on anonymous platforms, as they indisputably do at high volumes in the real world. Prof. Hendershott is likely correct that some stock loans would continue to transact OTC, but my methodology shows even those trades were impacted by the conspiracy. It thus does not matter that some trades (whether for their large size or any other reason) would take place in the OTC segment, consistent with Prof. Hendershott’s research.

¹³⁸ Hendershott Rpt. ¶ 161.

B. Centrally Cleared Platform Trading is Economically Viable

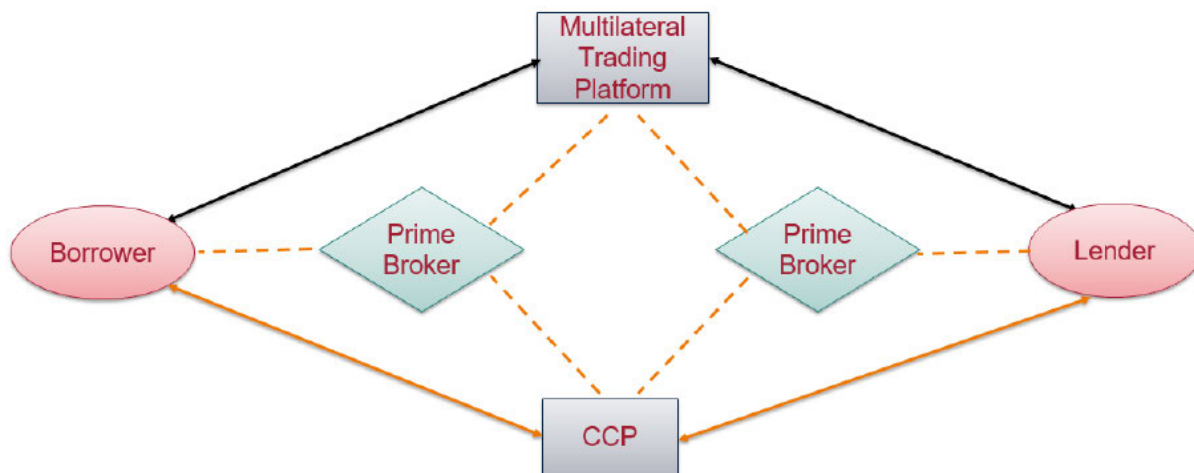
145. Prof. Hendershott's Section IV.C argues that the costs in the but-for world are understated in my opening report and the report by Profs. Asquith and Pathak. Exhibit 16 of Prof. Hendershott's report lists his estimated costs in the platform world for various trades if they are centrally cleared by a CCP. His cost items include the following:

- Item I, OCC Margin Costs (also Hendershott Rpt. § IV.C.2.a))
- Item II, Default Fund Contribution Cost (also Hendershott Rpt. § IV.C.2.b))
- Item III, Clearing Sponsor Regulatory Capital Costs under Basel III (also Hendershott Rpt. § IV.C.2.c))
- Item IV, AQS Platform Transaction Fees (also Hendershott Rpt. § IV.C.3.)

146. He also produced a “range” of various combinations of these costs. All these items are part of the $Platform\ Cost_j^{BFW}$ in my analytical framework laid out in Section II of this reply. As discussed there, conditional on the presence of the platform in the but-for world, these costs are inconsequential to the question of whether Class members are harmed in the OTC world; the answer to that question depends on whether the OTC cost will decline in the but-for world, which I answer in the affirmative. The purpose of analyzing these costs is to establish that a multilateral trading platform with central clearing of stock loans will emerge and create competitive pressure on OTC trades. Whether the introduction of a multilateral trading platform in the stock loan market impacts all or virtually all Class members does not depend on any of these cost analyses. Rather, these analyses are relevant only to the preceding question of whether entry by a platform is viable. For that, I need to show that the costs are sufficiently low for a substantial fraction of trades, but not all trades.

147. The market structure of the but-for world I consider here is the same as the one in my opening report, which I repeat below for clarity. In the but-for world, the end-user borrower and the end-user lender both generally gain access to the CCP via broker-dealers, who are

members of the CCP.¹³⁹ I will discuss the entire chain of transactions, with the shares following from the lender to CCP to borrower, with cash collateral flowing the other way. In practice, depending on the existing inventory of the prime brokers, it is possible that a prime broker only borrows but does not lend, or only lends but does not borrow. It is also possible that a broker both lends and borrows. In the graph below, the two prime brokers are plotted separately, but for practical purposes, it does not matter if they are the same or different prime brokers.



148. Prof. Hendershott makes numerous errors in Exhibit 16 of his report. With respect to regulatory capital costs, Prof. Hendershott: [REDACTED]

[REDACTED] (3) ignores the Nobel Prize winning finance principle known as Modigliani-Miller theorem; (4) misapplies or misunderstands the relevant regulations and market development in the Class Period; and (5) applies regulations in a manner entirely inconsistent with how Prime Broker Defendants' apply them in the real world, or would

¹³⁹ The exception to this general rule is the possibility of a special membership program at the CCP, which I discuss *infra* §§ III.B.1.

apply them in the but-for world. As a result of these mistakes, Prof. Hendershott's regulatory capital costs [REDACTED] compared to what they should be under any reasonable analysis.¹⁴⁰

149. Prof. Hendershott fails no better on his margin costs analysis. Here, Prof. Hendershott: (1) ignores that CCPs remit return on margin posted with them, (2) incorrectly recites relevant CCP rules, and (3) cherry-picks documentary evidence to assess punitive costs on the class, ignoring relevant, reliable, class-wide metrics. Once these errors are fixed, I show that Prof. Hendershott's margin costs [REDACTED] compared to what a reliable calculation should be.¹⁴¹

150. Between regulatory capital costs and margin costs, Prof. Hendershott's numerous errors led to roughly [REDACTED] costs. Correcting these errors and inputting reliable variables shows that securities lending incurs a cost that is evidently below the bid-ask spread in the actual world, which makes the centrally cleared platform solution viable.

1. *Regulatory Capital Costs*

151. At the outset, it is important to recognize what Prof. Hendershott does with respect to regulatory capital costs in his model. Prof. Hendershott applies the illustrative regulatory capital cost analysis that I performed in my opening report¹⁴² to all transactions in the chain, without any appropriate adjustment to the specific situation for each part of the chain.¹⁴³ As I discuss below, his approach leads to vastly inflated capital cost estimates.

¹⁴⁰ *Infra* § III.B.1.

¹⁴¹ *Infra* §§ III.B.2.

¹⁴² Zhu Rpt. ¶¶ 162-173.

¹⁴³ *See e.g.* Hendershott Rpt. § IV.C.2.c & Appendix C.

152. In addition, my analysis of this issue in my opening report related principally to agent lender capital costs.¹⁴⁴ This is because the main incremental capital cost change in the but-for world is a decrease in capital costs for agent lenders. My opening approach—to focus on incremental costs—centers the discussion on the relevant inquiry from a viability standpoint. If the OTC structure were viable in the actual world, i.e., the total surplus created by the stock lending market exceeds the total cost of this market, then the platform structure would also be viable in the but-for world as the capital costs for agent lenders would have decreased significantly. However, because Prof. Hendershott has engaged in substantial and incorrect gross cost analysis, I shall respond to his challenges on those terms as well.

153. Perhaps an easy test for whether Prof. Hendershott's capital cost calculations make sense is to assess their implications in the real world. Prof. Hendershott calculates the

[REDACTED]

[REDACTED]¹⁴⁵ [REDACTED]

[REDACTED] Profs. Asquith and Pathak have calculated the spread on general collateral transactions to be [REDACTED]¹⁴⁶ Thus, if Prof. Hendershott were correct about capital costs, prime brokers would [REDACTED] on general collateral loans in the actual world. Prof. Hendershott provides no evidence that [REDACTED]

[REDACTED] and such a result is implausible.

154. I now spell out the details of the capital cost calculation, using the same framework as Prof. Hendershott. In abstract form, the capital cost equation is $(TE \times RW) \times TR \times CC$, where TE means Trade Exposure calculated under the collateral haircut approach,

¹⁴⁴ Zhu Rpt. ¶¶ 162-173.

¹⁴⁵ Hendershott Rpt., Exhibit 16.

¹⁴⁶ Asquith & Pathak Rpt. Table XI.12.

RW means the Risk Weight applied to the transaction, TR means the Total Capital Ratio for the regulated entity, and CC means the Cost of Capital. The product of TE and RW is sometimes referred to as the risk-weighted asset associated with the transaction, or RWA.¹⁴⁷

155. The RWA represents a regulatory judgment of how risky a particular transaction is. Multiplied by the total capital ratio, the product represents the amount of capital a bank must have on hand to safeguard against the risk its counterparty defaults on that particular transaction. Finally, multiplied by the cost of capital, i.e., the cost to raise equity, the product simulates the opportunity cost associated with maintaining that capital buffer, for that transaction. Thus, simply put, this model attempts to estimate the opportunity cost of executing a single stock loan.

(a) Capital Ratio and Cost of Capital

156. Prof. Hendershott applies [REDACTED] [REDACTED] for agent lenders in my opening report.¹⁴⁸ Prof. Hendershott [REDACTED] [REDACTED] but nonetheless [REDACTED]¹⁴⁹ This is a basic mistake that ignores a Nobel Prize-winning idea in economics.

157. A fundamental theorem of corporate finance—known as the Modigliani-Miller Theorem—says that, under certain conditions, the value of the firm does not depend on the way it is financed. Applied in this context, it implies that a higher capital ratio makes the bank safer, and as a result, investors require a lower return on equity. Quantitatively, the original Modigliani-Miller model implies that the product of capital ratio and the required return on equity is a constant, which is equal to the required return on assets held by the bank. To be concrete, let's [REDACTED] as Prof. Hendershott did, the capital ratio of a bank-affiliated prime

¹⁴⁷ See, e.g., 12 C.F.R. Subpart D - Risk-Weighted Assets - Standardized Approach.

¹⁴⁸ Hendershott Rpt. ¶ 242 & Appendix C ¶¶ 17-20; Zhu Rpt. ¶ 168.

¹⁴⁹ Hendershott Rpt. ¶ 241 & Appendix C ¶¶ 17-20.

broker from [REDACTED] As a result, the bank is safer because it can sustain larger losses without entering bankruptcy. Therefore, investors in the bank's stock (equity capital) put a higher value on it, implying a lower required return. In the original Modigliani-Miller model, the new required return of the bank's capital would decline from [REDACTED] [REDACTED] [REDACTED] The cost of equity as a fraction of risk weighted asset does not change at all: it is [REDACTED]

158. The Modigliani-Miller Theorem has been discussed extensively in the context of bank capital regulations. Immediately after the financial crisis, numerous commentators argued against an increase in banks' capital requirements on the grounds that increased capital requirements would result in higher costs.¹⁵⁰ This view has been thoroughly debunked. In an illustrative article, stylized as a parable, Paul Pfleiderer (2010) likens the debate to an argument about whether the equation for the volume of a cylinder (an analog for the Modigliani-Miller Theorem) applies to the storage of gold in cylinders (an analog for banking).¹⁵¹ There is no shortage of academic papers on this point.¹⁵²

159. As a foundational insight of corporate finance, the Modigliani-Miller Theorem won the Nobel Prize in Economics in 1985 and is taught in all major business schools (including

¹⁵⁰ See, e.g., Skander J. Van den Heuvel, *The Welfare Cost Of Bank Capital Requirements*, 55 J. of Monetary Econ. 298, 299 (2008) ("[C]apital adequacy regulation can impose an important cost because it reduces the ability of banks to create liquidity by accepting deposits.").

¹⁵¹ Paul Pfleiderer, *On the Relevancy of Modigliani and Miller to Banking: A Parable and Some Observations* (Rock Center for Corp. Governance at Stanford University, Working Paper No. 93, 2010).

¹⁵² Anat R. Admati et al., *Fallacies, Irrelevant Facts, and Myths in the Discussion of Capital Regulation: Why Bank Equity is Not Socially Expensive* (Rock Center for Corp. Governance at Stanford University, Working Paper No. 161; Stanford University Graduate School of Business Research Paper No. 13-7, 2013), available at <https://ssrn.com/abstract=2349739> or <http://dx.doi.org/10.2139/ssrn.2349739>.

Prof. Hendershott's school).¹⁵³ I also explained the theorem in my deposition.¹⁵⁴ The critical point is that Prof. Hendershott cannot [REDACTED]

[REDACTED] This violates the Modigliani-Miller Theorem.

160. Similarly, Prof. Hendershott argues that global systemically important banks ("GSIBs") are subject to additional capital requirements that likewise increase costs.¹⁵⁵ Again, his argument implicitly [REDACTED] which violates the Modigliani-Miller insight. As I explained at my deposition, [REDACTED]

[REDACTED]¹⁵⁶

161. Given this analysis, I will continue to use a 12% capital ratio and a 10% cost of capital throughout the remainder of my cost analysis. These calculations are insensitive to increases in the capital ratio, as any increase will necessarily require a decrease in the cost of capital.

(b) The Collateral Haircut Approach

162. In my opening report, I applied the collateral haircut approach to illustrate the capital cost savings agent lenders would receive in the but-for world.¹⁵⁷ I intended this approach

¹⁵³ See Press Release, Nobel Prize Organization, This Year's Economic Prize Awarded for Pioneering Studies and of Financial Market (Oct. 15, 1985), <https://www.nobelprize.org/prizes/economic-sciences/1985/press-release/>; see also Syllabus, Economics 234C, Financial Decision-Making in Firms (2008), https://eml.berkeley.edu/~webfac/malmendier/e234c_s08/234C_revised.pdf (discussing the Modigliani-Miller Theorem in Class 9).

¹⁵⁴ Zhu Tr. 216:18-217:7 ("[REDACTED]").

¹⁵⁵ Hendershott Rpt. ¶ 243.

¹⁵⁶ Zhu Tr. 215:8-217:17 ([REDACTED]).

¹⁵⁷ Zhu Rpt. ¶¶ 167-171.

to be illustrative, as a way of making concrete the savings regulated entities garner from transitioning to a centrally cleared model for stock loans.¹⁵⁸

163. The collateral haircut approach is a standardized way of calculating exposures that regulated entities face for certain types of transactions. The basic form of the collateral haircut approach, in the hypothetical example of borrowing \$100 stock and posting \$102 cash as collateral, is described in my opening report.¹⁵⁹ For lenders, with no adjustments, the trade exposure is $\$100 \times (1 + 10.6\%) - \$102 = \$8.6$.¹⁶⁰ For borrowers, the trade exposure is $\$102 - \$100 \times (1 - 10.6\%) = \12.6 .¹⁶¹ In both, 10.6% is the supervisory haircut, representing how much the stock received may decrease in value and how much the stock lent may increase in value.¹⁶² Cash has zero haircut, so nothing is multiplied by \$102. It is worth noting that the exposure amount calculated using the collateral haircut approach varies by the amount of collateral. For example, suppose that a hedge fund borrows from prime broker \$100 worth of Tesla stock but posts \$120 worth of Ford stock as collateral, then the prime broker's trade exposure is $100 \times (1 + 10.6\%) - 120 \times (1 - 10.6\%) = \3.32 . Again, the logic behind the calculation of trade exposure is to assume an adverse scenario, in which stocks received depreciate and stocks posted appreciate. If the hedge fund posts \$130 worth of Ford stock as collateral, then the prime broker's trade exposure is further reduced to $100 \times (1 + 10.6\%) - 130 \times (1 - 10.6\%) = -\5.62 . Because regulatory trade exposures are nonnegative, in this last case, the prime broker's exposure is zero.

¹⁵⁸ *Id.* ¶ 167 (“To make the capital savings of a CCP under Basel III more concrete, I now go through a stylized example of capital calculations under bilateral and centrally cleared exposure.”).

¹⁵⁹ *Id.* ¶¶ 167-171.

¹⁶⁰ *Id.* ¶ 168.

¹⁶¹ *Id.* ¶ 170.

¹⁶² *Id.* ¶¶ 167-171.

164. The relevant haircut for assessing whether stock loan platform is viable is 10.6%. This represents the product of a regulatory 15% haircut on main index equities and a permitted downward adjustment of $\sqrt{2}$.¹⁶³ Prof. Hendershott instead applies a 20% haircut, based on a composite of the 15% haircut for main index equities and [REDACTED] haircut for other equities.¹⁶⁴ Prof. Hendershott relies on the declaration of [REDACTED] to suggest that [REDACTED] [REDACTED].¹⁶⁵ Assuming that [REDACTED] [REDACTED] Prof. Hendershott applies a composite 20% haircut.¹⁶⁶ However, as I explained in other parts of this report, the but-for world is one in which the platform segment and the OTC segment coexist. It is my opinion that the platform trading of main index equity loans is sufficient for the platform to achieve enough scale to have impact. Moreover, [REDACTED]¹⁶⁷ Thus, my opinion is that the relevant haircut for the viability of platforms is 15%. If the regulatory capital cost of transacting on a platform is too high for non-main index equities, they can continue to trade OTC, while main index equities trade on the platform. Furthermore, as discussed *infra* III.B.1.b, the haircut percentage turns out to be immaterial for capital cost, as it changes only the degree of overcollateralization necessary to reduce prime brokers' exposure to zero.

(c) Agent Lender Capital Costs in the But-For World

165. Having table-set the relevant calculations and figures, I now proceed to calculate the capital incurred under the collateral haircut approach, for each regulated entity, for each

¹⁶³ *Id.* ¶ 168.

¹⁶⁴ Hendershott Rpt. Appendix C ¶ 11.

¹⁶⁵ *Id.* Appendix C ¶ 11 & ¶ 11 n.16.

¹⁶⁶ *Id.* Appendix C ¶ 11.

¹⁶⁷ *See, e.g.,* [REDACTED] at '935.

exposure. Under this methodology, the capital cost to bank-affiliated agent lenders is **0.2 bps**, as described in my opening report.¹⁶⁸

166. On this item, I strongly disagree with Prof. Hendershott's calculations. He uses an outdated, if not outright incorrect, method of calculating exposures for trades cleared through CCPs. As a result, his estimate vastly overstates the capital cost of agent lenders for using CCPs.

167. Prof. Hendershott applies the wrong risk weight for this exposure. The question is: If a trade goes through a CCP, whose default risk does a bank-affiliated agent lender bear and what is the Basel III risk weight on that exposure? Prof. Hendershott claims, incorrectly, [REDACTED]

[REDACTED] As stated in my original report, after the series of reforms in the CCP space starting in 2009, the correct answer is that the agent lender is exposed to the CCP, and the risk weight is 2%.

168. The best way to resolve this disagreement is to refer to the regulation. 12 C.F.R. 217.35(b)(3)(i)(A), titled "Cleared transactions," states:

For a cleared transaction with a QCCP, a clearing member client Board-regulated institution must apply a risk weight of: (A) **2 percent** if the collateral posted by the Board-regulated institution to the QCCP or clearing member is subject to an arrangement that prevents any losses to the clearing member client Board-regulated institution due to the joint default or a concurrent insolvency, liquidation, or receivership proceeding of the clearing member and any other clearing member clients of the clearing member; and the clearing member client Board-regulated institution has conducted sufficient legal review to conclude with a well-founded basis (and maintains sufficient written documentation of that legal review) that in the event of a legal challenge (including one resulting from an event of default or from liquidation, insolvency, or receivership proceedings) the relevant court and administrative authorities would find the arrangements to be legal, valid, binding and enforceable under the law of the relevant jurisdictions

¹⁶⁸ Zhu Rpt. ¶ 168.

169. To paraphrase this rule in the context of stock loans, the regulation says that if the collateral posted by a bank-affiliated agent lender to the CCP is protected (or “bankruptcy-remote”) from the clearing member’s default, then the bank-affiliated agent lender must apply a risk weight of 2%. The segregation of client assets is the standard practice in central clearing in the United States during the Class Period.¹⁶⁹ In fact, the Commodity Futures Trading Commission (“CFTC”) has mandated the segregation of customer funds,¹⁷⁰ crystalizing the 2% risk weight. [REDACTED]

[REDACTED]¹⁷¹ The testimony he cites generally reflects outdated or otherwise incorrect views of central clearing. The regulation he cites¹⁷² applies to non-cleared transactions, not cleared transactions.¹⁷³ For my opening report and this reply, I rely on explicit federal regulations, as well as general market developments in the area of central clearing, a subject that I have studied extensively as part of my academic work and my advising role to national and international regulatory agencies.

¹⁶⁹ See Options Clearing Corporation, *The Options Clearing Corporation Disclosure Framework For Financial Market Infrastructures* 10 (2021), available at <https://www.theocc.com/getmedia/4664dece-7172-42a5-8f55-5982f358b696/pfmi-disclosures.pdf> (indicating that the OCC has legal opinions supporting the enforceability of bankruptcy remoteness of collateral held in its accounts). I further note that, even assuming the relevant account is *not* bankruptcy remote, the proper risk weight is only 4%. See 12 C.F.R. § 217.35(b)(3)(i)(B).

¹⁷⁰ See *Futures Commission Merchants (FCMs)*, Commodity Futures Trading Commission <https://www.cftc.gov/IndustryOversight/Intermediaries/FCMs/fcmsegregationfunds.html> (last accessed Oct. 1, 2021).

¹⁷¹ See Hendershott Rpt. ¶ 239 n.516 (citing [REDACTED] (2011), [REDACTED] (2010), and [REDACTED] (2012)).

¹⁷² Hendershott Rpt., Appendix C ¶ 8 n.7 (citing 12 C.F.R. § 217.37(a)(2); see also Hendershott Tr. 97:13-21 (“[REDACTED]”) (objection omitted).

¹⁷³ Compare 12 CFR § 217.37 - Collateralized transactions with 12 CFR § 217.35 - Cleared transactions (emphasis added).

170. The point made in my opening report stands. An agent lender who uses a CCP for stock loans will see its regulatory capital costs decrease from 10 bps in the real world to 0.2 bps in the but-for world, as a result of 12 C.F.R. § 217.35.¹⁷⁴ Absent a conspiracy, this substantial cost saving would have incented the market to move to a centrally cleared model for stock loans, as the massive OTC derivatives market has done so in the aftermath of the 2008-09 financial crisis. Prof. Hendershott's countervailing opinion is simply premised on a misreading of the relevant regulations.

(d) Clearing Member-CCP Exposure Costs in the But-For World

171. Next, I turn to the capital costs associated with the clearing member's exposure to the CCP's default. Under bank capital regulation, the cost of this exposure is zero.

172. In his report, Prof. Hendershott uses a ■ risk weight for the clearing member's exposure to the CCP, implicitly assuming that the prime broker is subject to the default of the CCP.¹⁷⁵ However, 12 C.F.R. 217.35(c)(3) states:

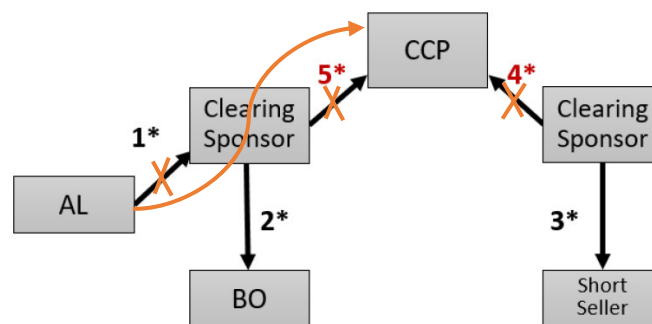
- (i) A clearing member Board-regulated institution must apply a risk weight of 2 percent to the trade exposure amount for a cleared transaction with a QCCP.
- (ii) For a cleared transaction with a CCP that is not a QCCP, a clearing member Board-regulated institution must apply the risk weight appropriate for the CCP according to this subpart D.
- (iii) Notwithstanding paragraphs (c)(3)(i) and (ii) of this section, **a clearing member Board-regulated institution may apply a risk weight of zero percent** to the trade exposure amount for a cleared transaction with a CCP where the clearing member Board-regulated institution is acting as a financial intermediary on behalf of a clearing member client, the transaction offsets another transaction that satisfies the requirements set forth in § 217.3(a), and the clearing member Board-regulated institution is not obligated to reimburse the clearing member client in the event of the CCP default.

¹⁷⁴ Zhu Rpt. ¶ 168. Note that, even assuming Prof. Hendershott's higher haircut, this figure is only 0.3 bps.

¹⁷⁵ See Hendershott Rpt., Appendix C ¶¶ 10, 17, & 19.

173. To paraphrase this rule in the context of stock loans, the clearing member can use a risk weight of 0% if it acts as an agent who does not guarantee the performance of the CCP to the customer. In practice, clearing members do not guarantee the performance of the CCP to the customers.¹⁷⁶ Therefore, my original report is correct in assigning a risk weight of zero for the prime broker's exposure to the CCP. Further, a 0% risk weight on the clearing member's exposure to the CCP is entirely consistent with the regulatory treatment of the agent lender, who is already exposed to the CCP's default. That is, the risk of CCP default should not be counted twice, once at the agent lender level and another at the clearing member level.

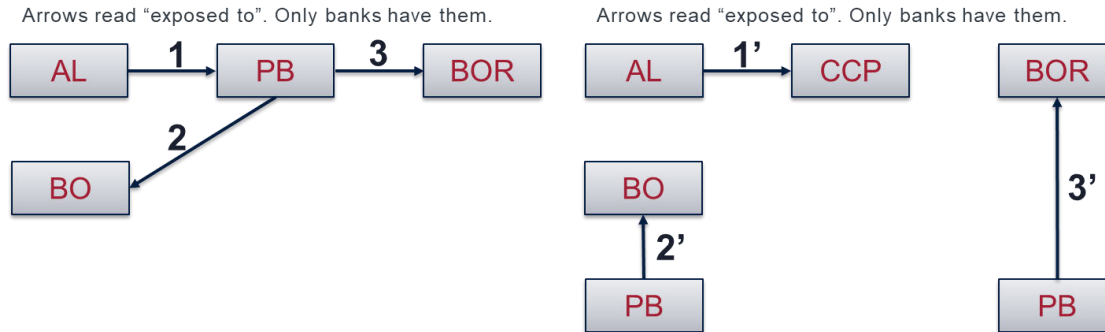
174. Given the explicit rules governing the capital calculation of cleared trades, as they relate to agent lenders and clearing sponsors, I correct Prof. Hendershott's chart below.



175. The corrected version recovers the graph in my initial report (see below).

¹⁷⁶ The reason that I apply a 2% risk weight—and thus exposure—to the agent lender is that the agent lender likely *will* guarantee the performance of the CCP to their beneficial owner clients, via indemnification.

Highly Confidential



176. In sum, Prof. Hendershott's disagreements with the 2% risk weight in my opening report are premised on a fundamental misunderstanding of the relevant rules and regulations. More broadly, he misses that one of the central tenants of Basel III is to *incent* the use of CCPs through *reduced* capital costs. As a result, the *incremental* regulatory capital costs of using a CCP model are *lower*, from a system-wide perspective, than those same costs in the OTC market.

(e) Clearing Member-End User Borrower Exposure Costs in the But-For World

177. I now calculate the remaining regulatory capital costs, namely the costs associated with prime brokers' exposures to end users, assuming that the prime brokers are bank-affiliated. These costs are the same in the but-for world as those in the real world. This is because the prime broker guarantees the end-user client's performance to the CCP in the but-for world and thus is exposed to the end user's default. The identical capital treatment between the two worlds is evidenced in both my opening report and Prof. Hendershott's opposition.¹⁷⁷ For the end-user borrower's exposure, I calculate the prime broker's capital cost to be zero bps, based on the industry practice of over-collateralization.

¹⁷⁷ Zhu Rpt. ¶ 167 (chart showing prime broker exposures to beneficial owners and end-user borrowers in both the cleared and OTC model); Hendershott Rpt., Appendix C ¶ 4 (showing same, labeled as 2* and 3*).

Highly Confidential

178. As discussed *supra* § III.B.1.b, the collateral haircut approach applies to this exposure. When the end-user borrower receives \$100 worth of borrowed stock, Prof.

Hendershott assumes [REDACTED]

[REDACTED]

179. End-user borrowers must have a prime brokerage agreement in order execute stock loans through one of the Prime Broker Defendants. In a Request for Information response,

[REDACTED]¹⁷⁸ [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]¹⁷⁹ [REDACTED]

[REDACTED]

180. Practically, [REDACTED]

[REDACTED]¹⁸⁰ [REDACTED]

[REDACTED]

[REDACTED]¹⁸¹ [REDACTED]¹⁸² In fact,

FINRA regulated broker-dealers have certain minimum margin account requirements that they

¹⁷⁸ Exhibit 4002 ([REDACTED]) ([REDACTED] Request for Information response to [REDACTED]).

¹⁷⁹ Exhibit 4002 ([REDACTED]) at '512 ("

[REDACTED]

[REDACTED]").

¹⁸⁰

¹⁸¹ [REDACTED] at '175.

¹⁸²

must ensure their clients meet, effectively ensuring assets will be available to over-collateralized loans.¹⁸³

181. As described in [REDACTED]

[REDACTED] 184 [REDACTED]

[REDACTED]¹⁸⁵ To be concrete, suppose that a hedge fund wishes to borrow \$100 of Tesla stock and pledges \$123.71 of other main index equity as collateral to the prime broker. Under the collateral haircut approach, the prime broker's exposure to the hedge fund is $\$100 \times (1 + 10.6\%) - \$123.71 \times (1 - 10.6\%) = \0 .¹⁸⁶ In fact, the \$123.71 amount is calculated precisely by $\$100 \times (1 + 10.6\%)/(1 - 10.6\%)$. Posting stock as collateral to the prime broker in an amount at least \$123.71 per \$100 stocks borrowed ensures that the prime broker's exposure is zero. For this reason, I believe that in the but-for world, an end-user borrower and its prime broker will work out such overcollateralization arrangements, if they do not already exist. Doing so virtually eliminates the capital costs associated with the prime broker's exposure to the end user borrower.¹⁸⁷ Of course, the product of any number and zero is zero, but to formalize the remainder of the capital cost equation— $\$0.00 \times 12\% \times 10\% = 0$ bps.

¹⁸³ See generally Rule 4210. Margin Requirements, FINRA, <https://www.finra.org/rules-guidance/rulebooks/finra-rules/4210> (last updated Dec. 15, 2016).

¹⁸⁴ See, e.g., [REDACTED] at '936 ("[REDACTED]"). Other [REDACTED] See, e.g., [REDACTED] at '233; [REDACTED]

¹⁸⁵ *Id.*

¹⁸⁶ Increasing the collateral pledged beyond \$123.71 yields negative exposures. Exposures cannot be negative. See e.g., The Basel Committee on Banking Supervision, *CRE – Calculation of RWA for Credit Risk* CRE52.10 (2019), available at https://www.bis.org/basel_framework/chapter/CRE/52.htm.

¹⁸⁷ Increasing the relevant haircut, as Prof. Hendershott does, merely increases the degree of over-collateralization necessary. It does not change the ultimate exposure figures.

182. At this point, it becomes transparent that using a higher haircut on borrowed stocks does not change the fundamental economics of overcollateralization. To be specific, if an end user borrows \$100 of non-main index equity, with $25\%/\sqrt{2} = 17.7\%$ supervisory haircut, and posts \$131.7 worth of main index equity as collateral, then the prime broker's exposure is still zero: $\$100 \times (1 + 17.7\%) - \$131.7 \times (1 - 10.6\%) = 0$.

183. Likewise, the loan could be collateralized in part with the cash proceeds from the short sale, and in part with additional equities from the end user borrowers margin account. Thus, $\$100 \times (1 + 10.6\%) - (\$100 + (E \times (1 - 10.6\%))) = \0 , where E represents the amount of additional equities required to eliminate the exposure. Solving for E, I determine that the amount of additional equities required, on top of the \$100 in cash, is \$11.86:

$$\frac{\$100 \times (1 + 10.6\%) - \$100}{1 - 10.6\%} = \$11.86.$$
 If the end user borrows non-main index equities and posts main index equity as additional collateral, E is $\frac{\$100 \times (1 + 17.7\%) - 100}{1 - 10.6\%} = \19.80 . Therefore, regardless of precisely how the loan is over-collateralized, or the haircut applied, the bank-affiliated prime broker exposed to the end-user borrower can eliminate its exposure.

184. Overcollateralization is not novel. The Basel Committee on Banking Supervision has recognized that regulated entities can perform this sort of risk and cost management.¹⁸⁸ Specifically, in a different but related context, CRE52.12 states: “The formulation set out in CRE52.10 above, does not permit the replacement cost, which represents today’s exposure to the counterparty, to be less than zero. However, banks sometimes hold excess collateral (even in the absence of a margin agreement) or have out-of-the-money trades which can further protect the

¹⁸⁸ See generally, The Basel Committee on Banking Supervision, *CRE – Calculation of RWA for Credit Risk* CRE52 (2019), available at https://www.bis.org/basel_framework/chapter/CRE/52.htm.

bank from the increase of the exposure. As discussed in CRE52.21 to CRE52.23 below, the SA-CCR allows such over-collateralisation and negative mark-to-market value to reduce PFE, but they are not permitted to reduce replacement cost.”¹⁸⁹ These rules recognize that banks already hold excess capital, which can be used to collateralize loans.

185. As a practical matter, therefore, the effective regulatory capital costs incurred for lending to end-user borrowers is virtually zero. Prof. Hendershott ignores the important role of overcollateralization in reducing capital costs. I expect that end-user borrowers will continue to overcollateralize their positions with prime brokers who sponsor the end users to the CCP in the but-for world. What is good for the goose is good for the gander—what works in the existing OTC market would continue to work in the but-for world platform market.

(f) *Clearing Member-Beneficial Owner Exposure Costs in the But-For World*

186. Having demonstrated that the regulatory costs associated with sponsoring end-user borrowers to the CCP is zero, I now proceed to calculate the same cost with respect to the beneficial owner. Adding the same overcollateralization on top of Prof. Hendershott’s method, I calculate the regulatory cost of capital for the prime broker’s exposure to the beneficial owner as zero bps.

187. The economics of overcollateralization on the beneficial owner side is nearly identical, although the exact numbers and the exact institutional procedures differ slightly. In the actual world, the beneficial owner delivers \$100 stocks and receives \$102 cash as collateral. This part remains intact in the but-for world. The extra piece in the but-for world is that the beneficial owner pledges additional securities, say stocks not lent out, to a ring-fenced account that is used to guard against the beneficial owner’s default but that is bankruptcy -remote from

¹⁸⁹ *Id.* CRE52.12.

the prime broker. This account is economically similar to an escrow account in which a renter puts a security deposit. The landlord can use this money to cover damages to the house, if any, but this money is legally the renter's property and cannot be used by the landlord in any other circumstance. Indeed, the holder of the escrow account is the renter, not the landlord. The ring-fenced account for the purpose of overcollateralization is entirely analogous, except that the assets posted there are securities that would otherwise sit idle anyway. All dividends and interest income generated from the securities, and the securities themselves, remain the beneficial owner's property. [REDACTED]

190

188. Sufficient overcollateralization in a ring-fenced account reduces the prime broker's exposure to the beneficial owner to zero. To be concrete, suppose the beneficial owner lends \$100 main index equity, receives \$102 cash, and posts \$14.1 idle main index equity to the ring-fenced account. From the prime broker's perspective, the regulatory exposure to the beneficial owner under the collateral haircut approach is $\$102 - \$100 \times (1 - 10.6\%) - \$14.1 \times (1 - 10.6\%) = 0$. As in the case of short sellers, increasing the haircut to 14.1%, per Prof. Hendershott, *supra* § III.B.1.b, merely increases the securities required in the ring-fence but

¹⁹⁰ See e.g., [REDACTED] at '184 ("

). [REDACTED]

does not change the economics of this arrangement. Note that beneficial owners are asset owners and have plenty of idle assets that they do not lend out.

189. There is an additional way that the beneficial owner exposure cost can be eliminated. The CCP can institute a special membership model, which would allow beneficial owners to directly transact with the CCP. [REDACTED]

[REDACTED]¹⁹¹ Prof. Hendershott suggests that special membership is speculative,¹⁹² but a special membership model was successfully introduced in Europe by Eurex¹⁹³ and the DTCC is poised to introduce such a model in the U.S.¹⁹⁴

2. *CCP Margin Costs*

190. Prof. Hendershott argues that [REDACTED]

[REDACTED]¹⁹⁵ His estimates [REDACTED]
[REDACTED]¹⁹⁶ Prof. Hendershott reaches his margin cost figures by multiplying a margin requirement by a financing rate.¹⁹⁷ In this calculation, Prof. Hendershott picked an unreasonably high financing rate and ignores important CCP rules. As a

¹⁹¹ See, e.g., [REDACTED] at '920 ("[REDACTED]").

¹⁹² See Hendershot Rpt. ¶ 224.

¹⁹³ See Eurex Clearing, *Innovative Buy-Side access models for central clearing* (2019), <https://www.eurex.com/resource/blob/244234/e400df7322679f9e7c4060ef6656fc7a/data/innovative-buy-side-access-models-for-central-clearing-presentation.pdf>.

¹⁹⁴ See DTCC, *Securities Financing Transaction (SFT) Clearing Service*, <https://www.dtcc.com/-/media/Files/Downloads/Clearing-Services/SFT-Clearing-Service-Fact-Sheet.pdf> (discussing limited direct membership).

¹⁹⁵ See Hendershott Rpt. § IV & Exhibit 16.

¹⁹⁶ *Id.* at Exhibit 16.

¹⁹⁷ Hendershott Rpt. ¶ 231 ("A clearing sponsor could meet the margin requirement by lending cash to the beneficial owner or short seller for an explicit financing fee and posting the cash as margin. Under this arrangement, the margin costs of a given stock loan transaction would depend on the margin requirement and margin financing rate that would apply to that particular transaction."); Hendershott Tr. 116:16-117:6 ([REDACTED]).

result, his margin cost estimates are vastly inflated for typical stock loan transactions. Again, I stress “typical” because for the purpose of viability, a platform with CCP clearing needs only to capture a subset of transactions, not all of them. Outliers are irrelevant for the variability discussion and may trade OTC in the but-for world. Once Prof. Hendershott’s errors are corrected, his own approach leads to [REDACTED] across both sides of the transaction.

(a) Margin Requirement

191. I have analyzed the OCC margin requirement to determine what a realistic estimate of that percentage would be in the but-for world. I conclude that a reasonable figure is 10%.

192. A margin requirement is a percentage the notional transaction value that must be posted to (kept with) the CCP, as collateral.¹⁹⁸ CCPs set their own margin requirements. At the OCC, the STANS methodology—a Monte Carlo-based risk management model—determines the margin requirement.¹⁹⁹ [REDACTED]

200

¹⁹⁸ See Hendershott Rpt. ¶ 230.

¹⁹⁹ *Margin Methodology*, Options Clearing Corporation, <https://www.theocc.com/Risk-Management/Margin-Methodology> (last accessed Oct. 1, 2021). Other CCPs use similar methodologies. See, e.g., National Securities Clearing Corporation (NSCC), *Rules and Procedures* (2021), available at https://www.dtcc.com/~media/Files/Downloads/legal/rules/nscc_rules.pdf.

200 [REDACTED] Tr. [REDACTED] (“

”).

Each Prime Broker Defendant clears non-stock loans through the OCC on behalf of their clients.²⁰¹

193. To provide further context, the initial margin is meant to cover the losses of the potential default of a counterparty. If a short seller fails to return the stock, the CCP may need to buy in the stock to deliver back to the lender. The CCP may incur losses if the stock appreciates quickly when the CCP attempts to buy it. More concretely, if a typical stock's volatility is about 2% per day (or 32% per year) and returns are normally distributed, then the probability that the stock appreciates by three standard deviations, i.e., a 6% price appreciation on a day, happens with only 0.14% probability. The probability that the stock appreciates 10% on a day, i.e., a 5 standard deviation move, is 0.000071%. Granted, stock returns are not exactly normally distributed and certain stocks have higher volatilities, but the numbers suggest that breaching the 10% initial margin buffer requires extraordinary movements of stock prices in the adverse direction. Indeed, the supervisory haircut for main index equities, set by bank regulators, is 10.6%.²⁰² Thus, 10% is a reasonable, and likely conservative, estimate of margin requirement.

(b) Beneficial Owners' Margin Costs In the But-For World

194. I have analyzed the cost of posting margin to the CCP for beneficial owners in the but-for world. I determine that this cost will be zero or slightly negative. There are two reasons. First, beneficial owners have substantial amounts of unlent securities available to post as margin collateral. These assets can be posted with zero opportunity cost, because they are not lent out. (As is standard, income generated from these assets is passed on to their owners.) Second,

²⁰¹ See e.g., *Market Directory*, Options Clearing Corporation, <https://www.theocc.com/Company-Information/Member-Directory> (last updated Sept. 7, 2021) (showing each Prime Broker Defendant has received membership to the OCC for non-stock loan products).

²⁰² See Zhu Rpt. ¶168; *supra* ¶164.

beneficial owners typically have short-term cash to post as collateral, and posting this cash is likely to earn a return above what would be earned in a riskless investment. Therefore, I conclude that the cost of posting initial margin for beneficial owners in the but-for world would be zero.

195. Beneficial owners have substantial amounts of owned assets they could post as initial margin, in particular, general collateral stocks that are not lent. Prof. Hendershott, for instance, explains that “[REDACTED]”²⁰³ Therefore, [REDACTED] of the general collateral (“GC”) owned by beneficial owners is available to be posted as initial margin. Because there is [REDACTED] for these assets, the opportunity cost associated with using them in this fashion is [REDACTED] If the demand for a GC stock posted as margin starts to increase, the beneficial owner can always pull it out and post another idle stock as margin instead. In addition, beneficial owners can also post unlent fixed income securities such as Treasury bonds as collateral.²⁰⁴ In total, the OCC accepts the following forms of margin collateral: (1) cash, (2) government securities, (3) GSE debt securities, (4) money market fund shares, and (5) equities, such as general collateral.²⁰⁵

196. Prof. Hendershott assumes that beneficial owners will need to borrow cash in order to satisfy their margin requirements.²⁰⁶ He explained at his deposition why [REDACTED] [REDACTED] He assumed that [REDACTED]

²⁰³ See Hendershott Rpt. ¶ 37.

²⁰⁴ See Options Clearing Corporation, *OCC Rules* OCC Rule 604(b)(1) (2021), https://www.theocc.com/getmedia/9d3854cd-b782-450f-bcf7-33169b0576ce/occ_rules.pdf (listing “Government Securities” as a permissible form of margin collateral).

²⁰⁵ See generally, *id.* at OCC Rule 604.

²⁰⁶ See Hendershott Rpt. ¶ 231.

²⁰⁷ This is incorrect. OCC Rule 604(b)(4) states that the OCC accepts “common stocks” as a “form of margin asset[.]”²⁰⁸ Given that the cost of posting idle assets is zero, I expect that the beneficial owner will employ this strategy unless a better one is available.²⁰⁹

197. For the purposes of my viability analysis, I assume the zero cost of margin for beneficial owners, based on the above analysis. This analysis will be applicable to all or virtually all beneficial owners. Moreover, in some circumstances, posting margin may even benefit the beneficial owners. Some beneficial owners—such as pension funds—maintain a portion of their portfolios as cash,²¹⁰ and the option of posting cash as initial margin can be even more advantageous to the beneficial owner. This is because it is a standard practice that initial margin posted to the CCP by customers (non-clearing members) is saved in a segregated account that earns an economic return. As noted in my original report, in July 2012, U.S. regulators have designated major CCPs (including OCC) and payment systems to be systemically important financial market utilities.²¹¹ Major CCPs such as OCC and CME Group (“CME”) have

207 Hendershott Tr. 120:13-121:15 (“
 ”).

²⁰⁸ See generally, Options Clearing Corporation, *supra* note 197, at OCC Rule 604.

209 *See infra.*

²¹⁰ See, e.g., Orange County Employees Retirement System, *OCERS Comprehensive Annual Financial Report* 37 (2020), https://www.ocers.org/sites/main/files/file-attachments/ocers_2020_ar_6-16-2021.pdf?1630024748 (noting that named plaintiff OCERS allocates a portion of their portfolio to cash); Los Angeles County Employees Retirement System, *LACERA Annual Financial Report* 36 (2020), http://www.lacera.com/sites/default/files/assets/documents/general/acfr_2020.pdf (noting named plaintiff LACERA does the same). For instance, pension funds may maintain a portion of their assets in cash to pay pensioners.

²¹¹ See Financial Stability Oversight Council, *Appendix A*, <https://home.treasury.gov/system/files/261/here.pdf>. The eight systematically important FMUs are the Clearing House Payment

subsequently opened accounts at Federal Reserve Banks in which they can deposit customer funds. These accounts pay an interest known as interest on excess reserves (IOER).²¹² The following snapshot from the CME website shows that CME currently pays customers IOER minus 5 bps:²¹³

Cash Interest Rates and Non-Cash Collateral Fees

[BACK TO COLLATERAL HOME](#)

Rates on USD cash

FINANCIAL SAFEGUARDS WATERFALL	INTEREST RATE PASS-THROUGH
Base House	Interest on Excess Reserves (IOER) less 5 basis points
Base Customer	IOER less 5 basis points
IRS House	IOER less 5 basis points
IRS Customer	IOER less 5 basis points
Guaranty Fund	5 basis points

198. The CME’s FAQ document explicitly recognizes the payment to customer segregated accounts: “Interest is paid into the account classification from which it is accrued – for example, interest accrued from customer segregated funds on deposit will be paid to the Clearing Member’s customer segregated account.”²¹⁴

Company, CLS Bank, Chicago Mercantile Exchange, the Depository Trust Company, Fixed Income Clearing Corporation, ICE Clear Credit, National Securities Clearing Corporation, and the Options Clearing Corporation. In particular, the OCC was a leading player in the central clearing of stock loans.

²¹² On July 29, 2021, the Federal Reserve changed the name to interest on reserve balances (IORB) because the required reserve is now zero, and all reserves are “excess” reserves. Because IOER is widely used in regulatory and academic discussions, and because the label IORB began after the class period, I will continue to use IOER to refer to the interest rate paid by Federal Reserve banks to banks and CCPs.

²¹³ See CME Group, *Cash Interest Pass-Through Program – FAQ* (2020), <https://www.cmegroup.com/clearing/financial-and-collateral-management/files/interest-pass-through-rate-faq.pdf>.

²¹⁴ See *id.*

199. The OCC has a similar arrangement. Its Schedule of Fees webpage shows:²¹⁵

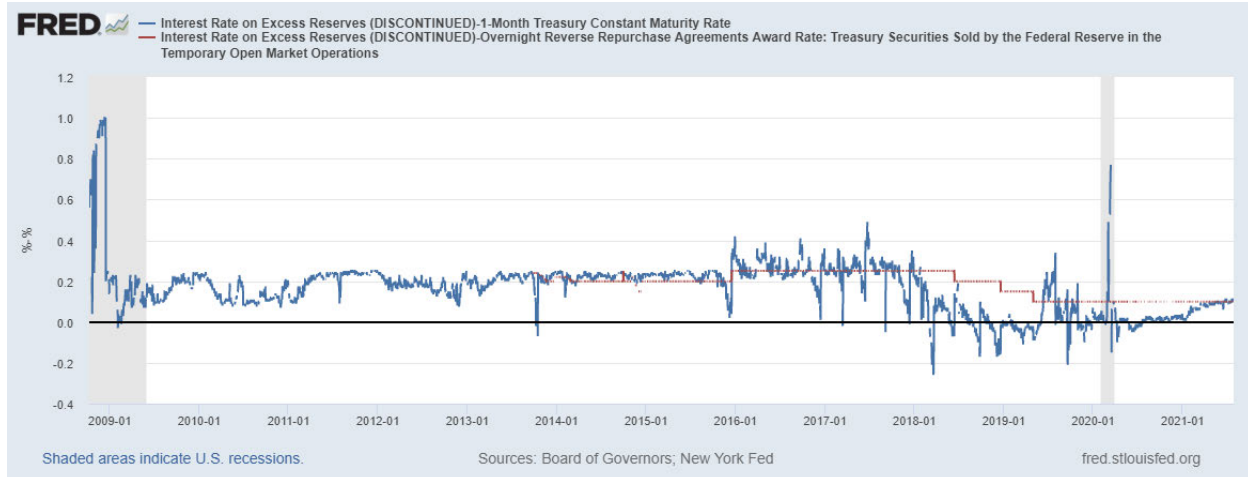
Cash Management Fee

Monthly annualized charge on Clearing Member's average daily cash balance in OCC's Federal Reserve bank account. **5 basis points**

200. Thus, customer margin deposited at segregated accounts will earn interest on excess reserve minus a very small fee in the but-for world. Next, a customers' return on cash deposited at Federal Reserve Banks (via the CCP) often exceeds other risk-free interest rates available to customers. The reason is that the Federal Reserve Banks restrict account access to limited types of institutions, primarily banks and CCPs. For other market participants, such as asset managers and hedge funds, the main risk-free asset is a short-term Treasury Bill. Starting in 2013, buy-side investors can also earn a return on cash via the Federal Reserve Bank of New York's reverse repo facility. The following chart, produced on the Federal Reserve Bank of St. Louis' webpage, shows that IOER pays a more favorable interest rate than short-term Treasury Bills and reverse repos:²¹⁶

²¹⁵ See *Schedule of Fees*, Options Clearing Corporation, <https://www.theocc.com/Company-Information/Schedule-of-Fees> (last updated June, 2021). While the document is not explicit about returns passed on to non-clearing members, in the but-for world, competitive pressure from other existing CCPs or potential CCP entrants will ensure that the OCC—or any other CCP clearing stock loans—will pass on returns earned from invested initial margin. This is evidence from the fact that the DTC is *currently* planning to enter the market, to compete with the OCC. See DTCC, *supra* note 187.

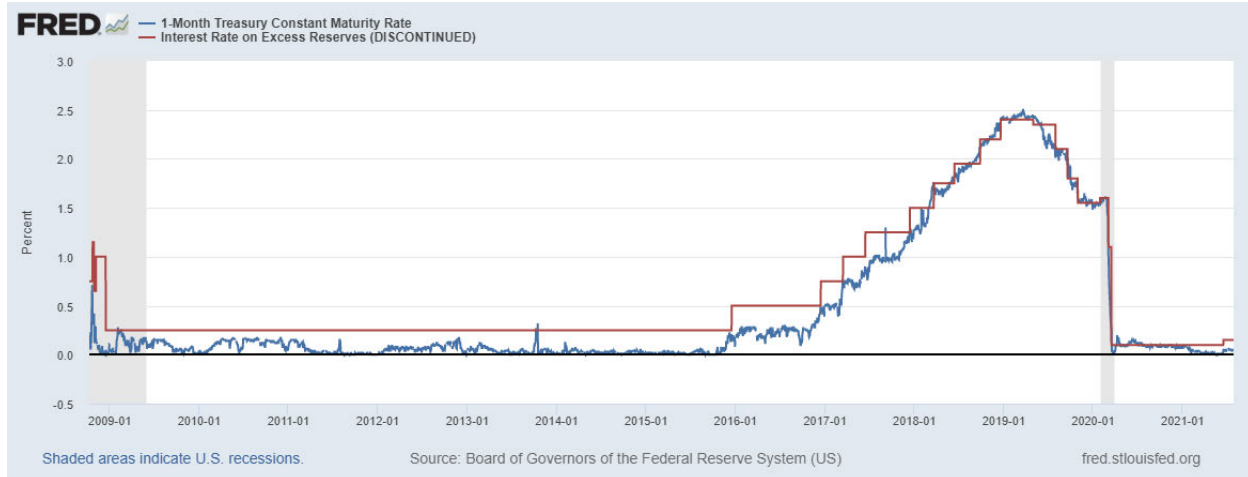
²¹⁶ See generally Federal Reserve Bank of St. Louis, FRED Economic, available at <https://fred.stlouisfed.org/>. This data is publicly available, and will be produced in excel form in my reliance materials.



201. In the class period, from January 1, 2012 to February 22, 2021, the IOER-Treasury bill spread is 15.5 bps on average. The following graph shows the IOER and Treasury Bill rate separately. There is a clear visible gap between IOER and 1-month Treasury Bill until about 2018. Likewise, from September 23, 2013 (start of reverse repo data) and February 22, 2021, the spread between IOER and reverse repo rate is 19.4 bps on average. Note that IOER is not a market-based rate, but an administered rate. Financial economists have recognized that the above-market IOER benefits those who have Federal Reserve Bank accounts, which in this case include CCPs and whoever is posting cash to the CCP. After taking out the 5 bps fee charged by CME and OCC, investors' returns by posting cash to CCPs as initial margin is still 10.5 bps and 14.4 bps above 1-month Treasury bill interest rate and reverse repo interest rate.²¹⁷

²¹⁷ *Id.*

Highly Confidential



202. To summarize, the data show that by using central clearing and depositing initial margin via the CCP, customers earn an economic return that exceeds the alternative risk-free rate in the market in the class period. After considering the fee charged by CCPs (5 bps currently by CME and OCC), I conclude posting initial margin to the CCP earns the customer a return that is at least as high as investing in short-term Treasury Bills. Therefore, for end users that have excess cash to invest, posting initial margin to the CCP incurs a cost that is zero or even slightly negative because IOER is higher than alternative risk-free rates. I conclude this case applies to buy-side investors including many beneficial owners as long as they allocate a part of their portfolios to cash.

(c) End-User Borrowers' Margin Costs In the But-For World

203. I have analyzed the cost of posting margin to the CCP for short sellers in the but-for world. I determine that this cost will conservatively range from **2 bps to 5 bps**. I base this conclusion on an analysis of available data relating to borrower risk and the fact that initial margin will earn a return in the but-for world.

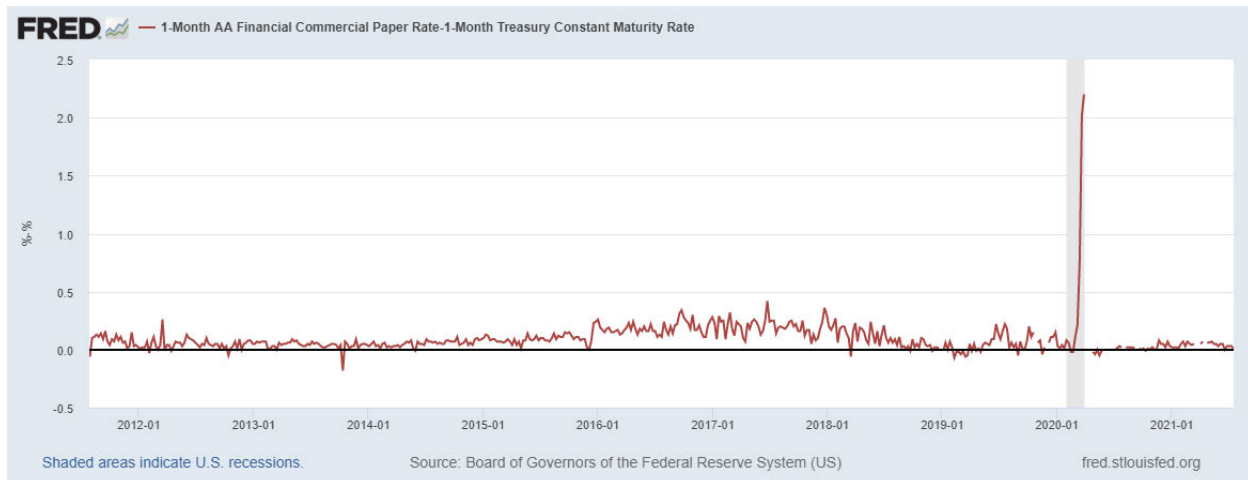
204. End-user borrowers may not have excess cash and may need to borrow the initial margin.²¹⁸ For example, hedge funds likely fall into this category. As mentioned above, initial margin posted to the CCP earns at least the fair market risk-free rate proxied by short-term Treasury Bill rate. Therefore, the cost of financing the initial margin is the interest rate at which the end user can borrow minus the risk-free interest rate. The following chart, produced using the Federal Reserve Bank of St. Louis' webpage, shows the AA financial paper interest rate minus 1-month Treasury interest rate. This spread hovers around 10 bps from 2012 to 2016, around 25 bps during the tightening cycle from 2016 to early 2019, and then collapses back to around 10 bps in early 2019 when the Fed started cutting rates again. The only exception is during the COVID recession of early 2021, when all credit spreads spiked temporarily but then were squashed by the Fed's aggressive asset purchase program and the CARES Act. Overall, the credit spreads in the class period were predominately and persistently low, with an average of 10 bps.

205. In sum, the data suggest that the average credit spread of AA rated financial institutions, and hence the cost of posting initial margin, is no more than 20 bps of margin throughout the period.²¹⁹

²¹⁸ This is not necessarily true, but I make this assumption to be conservative. Obviously, if a short seller has fully paid long positions or cash, they may use the methods listed above in § III.B.2.b.

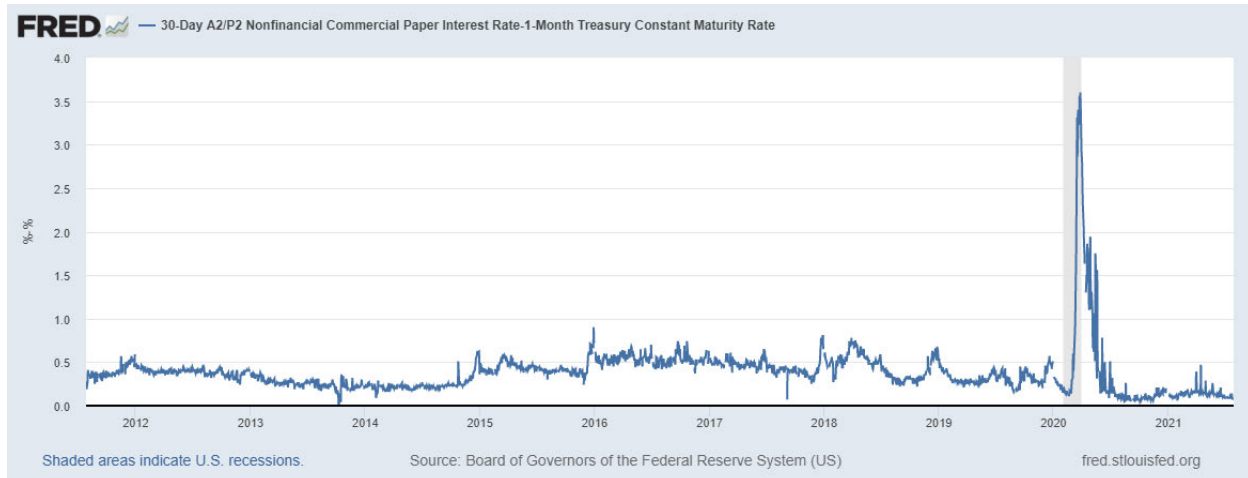
²¹⁹ See generally Federal Reserve Bank of St. Louis, FRED Economic, available at <https://fred.stlouisfed.org/>.

Highly Confidential



206. To be conservative, I also include the A2 nonfinancial commercial paper rate minus IOER below. This spread is wider. It stays consistently below 50 bps from 2012 to 2016, hovers around 40 bps from 2016 to early 2019 (rate hiking cycle), and then stays consistently below 50 bps since early 2019 (rate cutting cycle) with a brief exception of the COVID recession in the first quarter of 2020. In the class period, the average spread is about 39 bps. I add an additional 10 bps to account for risky end-user borrowers. Thus, 50 bps is a conservative proxy for the credit spread of lower-rated borrowers in the commercial paper market. According to the Federal Reserve, there are only two ratings for commercial papers, AA and A2.²²⁰

²²⁰ See *Commercial Paper Rates and Outstanding Summary*, Federal Reserve, <https://www.federalreserve.gov/releases/cp/about.htm> (last updated Sept. 18, 2020).



207. Summarizing, for end users that must borrow initial margin to post to the CCP, conservative estimates of credit spreads would be 20 bps for high-credit-quality end users and 50 bps for low-credit-quality end users.

208. At a 10% margin requirement,²²¹ **the margin cost would be 2-5 bps** for the end-user borrower.²²² These numbers are also the total margin cost for both sides of a typical transaction, given that the beneficial owners' cost is zero.

(d) Professor Hendershott's Cherry-Picked Examples

209. Finally, I address the figures Prof. Hendershott uses in his margin-costs analysis. As a general point, Prof. Hendershott [REDACTED]²²³

[REDACTED]

[REDACTED]²²⁴

As discussed *supra*, when robust real world data—such as Treasury bill interest rates as determined by all investors in the world—are used to answer questions relating to margin costs, the figures are substantially lower than those Prof. Hendershott came up with and incorporated

²²¹ See *supra* § III.B.2.a.

²²² 20 bps * 10% = 2 bps; 50 bps * 10% = 5 bps.

²²³ See Hendershott Rpt. Exhibit 16.

²²⁴ See Hendershott Tr. 264:15-267:21.

by Prof. McCrary into his damages model. Further, Prof. Hendershott multiplies all of his margin costs by two, assuming they will be incurred equally on both sides of the transaction. This is incorrect, because, for the reasons discussed *supra* § III.B.2.b, beneficial owners will incur zero margin costs.

210. I now turn to address each of Prof. Hendershott's margin costs scenarios. Prof. Hendershott's first scenario for margin costs—Exhibit 16.I.A—assumes a margin financing rate of [REDACTED] and a margin requirement of [REDACTED].²²⁵ These figures are in line with my assessment of margin costs for end-user borrowers, and I am generally in agreement with their applicability to that side of the market. However, application to the beneficial owner side of the market is misguided. Notably, one of Prof. Hendershott's sources specifically mentions the possibility that

[REDACTED]

[REDACTED]²²⁶

211. Prof. Hendershott's second scenario—Exhibit 16.I.B—is identical to his first, except that it applies a different margin financing rate. Instead of [REDACTED] Prof. Hendershott assumes a financing rate of [REDACTED] based on a [REDACTED] document from the record.²²⁷ Again, this is not out of step with my analysis for the end-user borrower. Rather, it represents the worst-case scenario. It is, however, incorrect for the beneficial owner.²²⁸

²²⁵ *Id.*

²²⁶ [REDACTED] at '440 ("[REDACTED]").

²²⁷ *See* [REDACTED] at '784.

²²⁸ I note that the [REDACTED] document cited by Prof. Hendershott is directly at odds with the testimony and report Mr. Savoldelli, Defendants' industry expert on hedge funds. Mr. Savoldelli opines that [REDACTED]. *See* Expert Report of Fabio Savoldelli ¶ 93-106, ECF No. 432-4 ("Savoldelli Rpt."); Savoldelli Tr. 200:25-201:22, 203:8-207:3, 211:19-214:19, 228:15-231:9. The document shows that [REDACTED] at '784.

212. Prof. Hendershott's third scenario—Exhibit 16.I.C—applies a [REDACTED] margin requirement and a margin financing rate of [REDACTED].²²⁹ For the margin requirement, Professor Hendershott cites a stray [REDACTED] document from 2011.²³⁰ As discussed above, CCPs gained their status as systematically important financial market utilities in 2012, which subsequently enabled them to earn the IOER and pass it onto investors. This means a single document from 2011 is largely irrelevant for this calculation. For the sake of argument, even if some short sellers paid a financing rate of [REDACTED] in the class period, the financing cost would be about [REDACTED] part should not be counted as a cost. Prof. Hendershott includes the risk-free interest rate, calculating the total as a raw interest rate.²³¹ As explained *supra*, the proper margin financing rate is the interest rate spread, not the raw interest rate.

213. Finally, Prof. Hendershott's fourth scenario—Exhibit 16.I.D—assumes a margin requirement of [REDACTED] and a margin financing rate of [REDACTED]. For the margin requirement, Prof. Hendershott cites [REDACTED]
[REDACTED]²³² These figures are outside of the statistical norm, making such a scenario irrelevant from the viability standpoint. Again, a stock loan platform need not cover extreme outlier like this one to be viable, just like Uber or Lyft need not take every single rider to be successful. Such abnormal portfolios can still be traded OTC in the but-for world,

Moreover, the same document demonstrates that [REDACTED]
[REDACTED]

Id. I discuss this and related issues in Section IV.B.1.

²²⁹ [REDACTED]

[REDACTED] Hendershott Rpt. Exhibit 16.

²³⁰ *See* [REDACTED] at '946-'947.

²³¹ [REDACTED]
[REDACTED]

²³² *See* [REDACTED]

Highly Confidential

and I am confident that prime brokers will impose a high bilateral margin on them as well. Prof. Hendershott [REDACTED]

[REDACTED]²³³ The cited document is [REDACTED]²³⁴ and Prof. Hendershott's methodology combines the portfolio of one entity [REDACTED] with the financing rate of another [REDACTED] making it incoherent. In any case, the [REDACTED] is close to the rates discussed *supra*.²³⁵

214. Rather than responding to other anecdotes, I reiterate that anecdotes are irrelevant for the economic viability and impact of platform and CCPs. For the purpose of showing that a platform is viable, the issue is whether platform trading makes sense for a sufficient percentage of trades. Transactions far in the tails, as Prof. Hendershott raises, simply do not matter for this assessment.

3. *Default Fund Contribution Cost*

215. Prof. Hendershott assumes [REDACTED] of cost to both sides of the platform ([REDACTED] total), from default fund contributions.²³⁶

216. According to 12 C.F.R. 3.35(d), bank-affiliated clearing members can calculate their capital cost for exposure to CCP in two ways. Method 1 uses a complex formula that involves some summary statistics of the CCP, including the number of clearing members and the total amount of default fund contribution from all sources, including non-stock loans.²³⁷ Method 2, which is simpler, says that the risk-weighted asset can be calculated as $\min(12.5 * DF, 0.18 *$

²³³ Hendershott Rpt. Exhibit 16.

²³⁴ See generally [REDACTED]

²³⁵ See *supra* Section III.B.2.c.

²³⁶ Hendershott Rpt. ¶ 236 & Exhibit 16.

²³⁷ 12 C.F.R. § 3.35(d)(3)(i).

TE), where DF is the default fund contribution and TE is trade exposure calculated the same way as the risk-weighted capital cost.²³⁸

217. The clearing broker that is borrowing from the CCP is the sponsor for the end-user borrower, i.e., it borrows from the CCP in order to lend to the end-user borrower. As calculated above, the clearing broker's exposure to the CCP—for the borrow—is $\$102 - \$100 \times (1 - 10.6\%) = \12.6 . This is the trade exposure (TE). Applied to the default fund formula, the broker's risk-weighted asset against the CCP is no more than $0.18 \times 12.6 = \$2.268$. Assuming a 12% capital ratio and 10% required return on equity, the capital cost is no higher than $\$2.268 \times 12\% \times 10\% = \0.027216 , or about 2.7 bps of trade notional value. This is in line with Prof. Hendershott's assumption, albeit somewhat lower.²³⁹

218. The same arithmetic can be done for the clearing broker that is loaning to the CCP, i.e. borrowing from the beneficial owner. The clearing broker's exposure to the CCP—for the loan—is $\$100 \times (1 + 10\%) - \$102 = \$8.6$. Applying this trade exposure to the default fund formula, the broker's risk-weighted asset against the CCP is no more than $0.18 \times \$8.6 = \1.554 . Thus, assuming a 12% capital ratio and 10% required return on equity, the capital cost is no higher than $\$1.554 \times 12\% \times 10\% = \0.018648 , or about 1.9 bps of trade notional value. Again, this is lower than Prof. Hendershott's assumption, but generally close.²⁴⁰

²³⁸ *Id.* § 3.35(d)(3)(iv).

²³⁹ Assuming Prof. Hendershott's higher haircut (14.1%), for completeness, the exposure is $\$16.14$. *See* Hendershott Rpt. Appendix C ¶ 10. Thus, the risk weighted assets are $\$2.91$ ($0.18 \times \$16.14 = \2.91). Therefore, the cost is 3.5 bps ($\$2.91 \times 12\% \times 10\% = \0.0349582). The difference is not material to my analysis because it is quite small, and in any case applies an incorrect haircut.

²⁴⁰ Assuming Prof. Hendershott's higher haircut (14.1%), for completeness, the exposure is $\$12.14$. *See* Hendershott Rpt. Appendix C ¶ 10. Thus, the risk weighted assets are $\$2.19$ ($0.18 \times \$12.14 = \2.19). Therefore, the cost is 2.6 bps ($\$2.18 \times 12\% \times 10\% = \0.02628). Again, the difference based on the haircut is not material and uses too high a haircut.

4. *Trading Platform Costs*

219. Setting up the multilateral trading platform and central clearing requires investments into technological, operational, and legal infrastructure. As I have argued in my opening report, such investments are incurred in the OTC market in an ad hoc and duplicative fashion.²⁴¹ In the but-for world, the CCP and multilateral trading platform make these investments in a larger scale, which is more efficient. The cost savings here on end users would already be substantial.

220. Prof. Hendershott criticized my use of Nasdaq as a benchmark in my opening report because Nasdaq is a stock exchange, not an exchange for stock loans. While transaction costs in stock markets are often quoted as a fraction of transaction value, the transaction costs in the stock loan market are quoted as a fraction of loan balance per year, just like an interest rate is calculated. When I mentioned that the stock loan platform would charge 2 bps, I plainly meant 2 bps of loan balance per year, as there are no other meaningful units. Prof. Hendershott misinterpreted the 2 bps as 2 bps of transaction value, which would not make sense.

221. To clarify this issue, I provide additional evidence in stock lending markets, where the fees are in the unit of basis points per year. The closest example is the Options Clearing Corporation. OCC charges very low prices for its Stock Loan/Hedge program: “OCC clearing fees are \$1.00 per new transaction assessed against each lender and borrower. Additionally, the borrower is assessed 0.4 basis point monthly annualized charge on average daily notional outstanding balances. There are no fees for returns or recalls.”²⁴² Thus, at least

²⁴¹ Zhu Rpt. § V.B.1.

²⁴² See *OCC Stock Loan/Hedge Program FAQs*, Options Clearing Corporation <https://www.theocc.com/Clearance-and-Settlement/Stock-Loan-Programs/Stock-Loan-FAQs> (last visited Oct. 1, 2021).

for the clearing part, the fee is extremely low, and this thin fee is apparently sufficient for the OCC to cover its costs of clearing stock loan transactions.

222. All-in fees that include transactions and clearing can be found in other countries. For example, the Taiwan Stock Exchange operates an exchange-based stock lending market, including central clearing. As described on its website, the service fee charged by TWSE and the broker in the competitive bid mechanism add up to only 2% of the lending fee that the borrower pays the lender.²⁴³ The service fee is split 80%/20% between TWSE and the brokers. For example, if the lending fee is 150 bps per year, the total service fee is only $2\% \times 150 = 3$ bps per year, of which 2.4 bps go to the TWSE and 0.6 bp goes to the brokers. If the lending fee is 20 bps per year, the total service fee is only 0.4 bp per year, of which 0.32 bp go to the TWSE and 0.08 bp go to the broker. These fees are very low, and yet, both the TWSE (CCP and trading venue) and brokers can still make it a sustainable business by charging only 2% of the lending fee per year.

223. Another example is the Malaysian stock lending market, which also has an exchange model. Bursa Malaysia charges 4 bps per year levied only on the borrowing side, or 2 bps per year on both sides of the transaction.²⁴⁴

224. Given that the U.S. stock loan market is much larger than the stock loan markets in Taiwan and Malaysia, I expect that the fees in an exchange model of stock loans, including multilateral trading and central clearing, would be no higher than the fees in Taiwan or Malaysia. Thus, my baseline scenario is that the platform fee in the but-for world, including trading fee and

²⁴³ See *FAQs*, Taiwan Stock Exchange, <https://www.twse.com.tw/en/page/products/sbl/faq.html> (last visited Oct. 1, 2021).

²⁴⁴ See *Securities Borrowing & Lending (SBL) – Overview*, Bursa Malaysia, https://www.bursamalaysia.com/trade/post_trade/securities_borrowing_lending/negotiated_transaction/overview (last visited Oct. 1, 2021).

clearing fee, is 4 bps per year total, as a fraction of total loan balance, covering both sides of stock loan trades.

225. Prof. Hendershott's Exhibit 18 (also section IV.C.3.a)) shows the [REDACTED] [REDACTED] which depends on the level of stock lending fee itself and involves a volume discount. [REDACTED]

[REDACTED] The AQS maintenance fee looks economically reasonable to me. For stock loans that have low economic surplus (GC), the fee is low and flat; for loans that have high economic surplus (hard to borrow), the fee is set to be a small fraction of the economic surplus itself. Thus, [REDACTED] [REDACTED]—at least as to GC—my assumption of 2 bps per side per year is conservative.²⁴⁵

226. Prof. Hendershott also cites the [REDACTED] [REDACTED] These fees are invariant to a user's trading activity and hence can be characterized as "fixed."

227. The fixed platform fee charged by AQS in the real world is not especially relevant to my analysis. I have assumed that Defendants conspired to boycott AQS. Under these pressures, it is unsurprising AQS charged fixed fees, to account for lower variable fees resulting

²⁴⁵ I understand that Profs. Asquith and Pathak use these AQS maintenance fees as an input in their damages model. There is nothing unreasonable about this input, and my use of 2 bps to each side below indicates only how I am assessing *viability*, by reference to comparable markets. This is not intended to suggest that there is anything unreliable about the 1.75 bps, as to general collateral, from a *damages* perspective.

from restrained liquidity. Platforms that aim to gain market share have strong incentives to be flexible in their fee structure. For example, the OCC has a very simple fee structure that depends linearly on the number of trades and the average loan balance, without any fixed fee component. Most credit cards do not have annual fees. Internet-based TV providers typically do not charge setup fees or activation fees (which can be viewed as fixed fees). [REDACTED]

[REDACTED]²⁴⁶ In other words, [REDACTED] He added, “[REDACTED]

[REDACTED]²⁴⁷ Finally, he put the finger on the issue: “[REDACTED]

[REDACTED]²⁴⁸ Indeed, for the discussion of whether stock loan platforms are viable, the relevant question is whether *some reasonable* pricing strategy would have worked absent conspiracy. I believe a platform fee schedule that has no fixed fee component and charges only a fee equal to a fraction of the economic surplus, such as the fee scheduled used by the Taiwan Stock Exchange, would have attracted users quickly. Under such a design, trades with lower economic surpluses are charged a lower fee.

5. *Total Costs*

228. Having discussed various components, I now summarize the total costs incurred by various parties in the but-for world in the following table. The unit of all costs are in bps,

²⁴⁶ [REDACTED] Decl. ¶ 7.
²⁴⁷ [REDACTED] Decl. ¶ 8.
²⁴⁸ [REDACTED] Decl. ¶ 9.

Highly Confidential

annualized. For example, 1 bp cost on a \$100 loan held for a year incurs a cost of \$0.01. The numbers in the table are calculated based on a typical stock loan transaction involving a main index equity.

BUT-FOR WORLD (annualized costs as fractions of stock loan balance)	Agent Lender/Beneficial Owner	End-User Borrower
Risk-weighted capital cost	0 bps (beneficial owner exposure costs) 0.2 bp (agent lender exposure to CCP costs)	0 bps (end user borrower exposure costs)
Margin cost	0 bps	2-5 bps
Capital cost for default fund contribution	3 bps	3 bps
Platform and CCP fee	2 bps	2 bps

229. Thus, the cost of platform use for the beneficial owner/agent lender is 5.2 bps.²⁴⁹ The cost of sponsorship for the end-user borrower ranges from 7 bps to 10 bps. The total cost across both sides ranges from 12.2 bps to 15.2 bps. These figures are gross. For comparison, I have calculated the total margin cost to be between 2 bps and 5 bps, whereas Prof. Hendershott has calculated the range as [REDACTED]²⁵⁰ I have calculated the clearing sponsor's regulatory capital costs as zero bps, whereas Prof. Hendershott has calculated the cost as [REDACTED]²⁵¹ Prof. Hendershott's total results are an order of magnitude higher than the results of a proper analysis.

230. In their reply report, Profs. Asquith and Pathak analyzed the [REDACTED]
[REDACTED]²⁵² Thus, even using the high-cost estimate, on the

²⁴⁹ I note that the risk weighted capital cost incurred by the agent lender is not part of the sponsorship fee ultimately charged by the clearing member to the beneficial owner.

²⁵⁰ Hendershott Rpt., Exhibit 16.

²⁵¹ *Id.*

²⁵² Asquith & Pathak Reply Rpt. Exhibit D.3.

Highly Confidential

lowest spread transactions, there is [REDACTED] of value to be captured by switching to platform trading. (I recognize that GC lenders are not part of the class.) For warm stocks, whose spreads are [REDACTED] according to Profs. Asquith and Pathak's analysis,²⁵³ the value that can be harvested by [REDACTED] [REDACTED] The value is substantially greater with respect to hard to borrow stocks, where the [REDACTED]²⁵⁴ [REDACTED] [REDACTED] Overall, the costs of centrally cleared platform trading are [REDACTED] This implies a centrally cleared platform solution would be able to enter and successfully undercut the prevailing OTC spread, driving the class-wide impact outcomes I have discussed in my report.

6. *Competitive Abuse of Sponsorship Fees*

231. The fee schedules I tabulated above suggests that sponsoring brokers incur certain costs, and it is reasonable to expect that sponsoring brokers pass on the costs to end users in the form of sponsorship fees. It is important to note, however, that the sponsorship fee charged in the real world represents not just the cost of providing the services, but also a profit margin.

232. Prof. Hendershott's Exhibit 17 [REDACTED] [REDACTED] His numbers are "[REDACTED] [REDACTED]"²⁵⁵ In other words, Prof. Hendershott assumes that [REDACTED] [REDACTED]

233. Prof. Hendershott's Exhibit 17 shows that [REDACTED] [REDACTED]

²⁵³ Asquith & Pathak Reply Rpt. Exhibit D.3.

²⁵⁴ *Id.*

²⁵⁵ Hendershott Rpt. Exhibit 17.

Highly Confidential

[REDACTED] The starkly inflated prices are consistent with the conspiracy allegation itself, i.e., prime brokers vastly overpriced the access to the AQS platform in order to limit the use of that platform. Record evidence confirms that [REDACTED]

[REDACTED] For instance, [REDACTED] wrote: “[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]²⁵⁶ [REDACTED] observation is [REDACTED]

234. Prof. Hendershott’s argument is not logically consistent; he cannot use inflated sponsorship fees set by prime brokers to argue that the exchange model for stock loans is not viable. Setting exorbitant prices on access to market infrastructure is one way to block entrants that use the same infrastructure. As shown above, the sponsorship fees are far above cost. This indicates a lack of competition, not a lack of platform viability.²⁵⁷

²⁵⁶ Exhibit 1011 ([REDACTED]).

²⁵⁷ I note that Prof. Hendershott’s Exhibit 17 also [REDACTED]

[REDACTED] This phenomenon—typically referred to as “umbrella pricing”—is common in industrial economics and antitrust cases. Ulrich Laitenberger & Florian Smuda, *Estimating Consumer Damages in Cartel Cases*, 11 J. of Competition Law & Econ. 955, 956-957 (2015), available at <https://doi.org/10.1093/joclec/nhv030> (“Our results further suggest that the retailers reacted to the price increases of the cartel firms via price increases for their own detergent products, resulting in significant umbrella effects.”).

IV. ALL CLASS MEMBERS WERE IMPACTED BY THE CONSPIRACY

235. In Section III, I addressed the criticisms of Defendants’ experts of my opinion that it would have made economic sense for multilateral trading platforms to enter the stock lending market and allow at least some Class members to trade on them. I now address their criticisms of my opinion that all or virtually all Class members would benefit from the successfully entry of such platforms.

236. As I discuss in Section IV.A, first and foremost, the “competition” effects of the platform—notably causing the prime brokers to quote better prices—would outweigh any liquidity harms in the OTC sector of the market. This is true under all reasonable economic assumptions.

237. In Section IV.B, I address Defendants’ “captive customer” argument. Specifically, Defendants posit that there are some Class members that would never use the platform, and therefore cannot plausibly benefit from the introduction of a platform in the absence of a credible threat. The arguments are not consistent with basic economic principles. For one, it is economically implausible that prime brokers have perfect economic information—and foresight—to determine with certainty that certain Class members would never use the platform in the future. Second, I also expect platforms would rationally give discounted prices to attract marginal Class members that may not have enough resources or trading activity to pay the full sticker price. As discussed above, an example of such a pricing strategy would be a platform waiving fixed fees and charging only a variable fee that depends on trading activity level.

A. The Competition Effects of Platforms Would Have Outweighed the Liquidity Effects on the OTC Market

238. In paragraphs 363-367, Prof. Hendershott argues that some Class members who remain OTC in the but-for world might be worse off “due to the negative liquidity externalities generated by a successful platform.” I disagree with his conclusion for a few reasons.

239. First, even if an end user stays OTC, it does not mean that the end user has no outside options, including the threat of terminating the broker if the end user cannot get good enough terms. The existence of the platform gives the end user additional bargaining power, in the same way that the arrival of internet-based TV enables consumers to bargain for better deals with cable companies—even if the consumer decides to keep the cable TV.

240. Second, liquidity externalities could, in fact, be positive rather than negative. Under the “liquidity externality” argument of Prof. Hendershott, if some trading activity migrates from OTC to the platform, the OTC market may experience higher transaction costs due to reduced activity. But Prof. Hendershott omits a strong countervailing force: a successful platform is likely to attract additional supply and demand of stock loans due to its better prices and narrower spread. As long as one or more major market participants use both market segments, the two segments become connected by “no-arbitrage,” i.e., similar products are traded at similar prices.

241. To see this, let’s consider a numerical example. Suppose the platform bid and ask of a stock loan are 100 bps and 110 bps (10 bps spread), and the OTC bid and ask are 90 bps and 120 bps (30 bps spread). An intermediary (not necessarily a Defendant) who has access to both segments can conduct the following trades. As soon as an OTC customer wishes to borrow, the intermediary immediately borrows the shares on the platform at 110 bps and lends it to the customer at 120 bps, earning 10 bps as profit. Or, as soon as an OTC customer wishes to lend,

the intermediary can immediately borrow from the customer at 100 bps and lend it at 110 bps on the platform, again earning 10 bps.

242. Either way, the intermediary receives the OTC half-spread of 15 bps and pays the platform half-spread of 5 bps. The intermediary is effectively sourcing liquidity from the platform and providing it OTC. In finance jargon, it is known as arbitrage, i.e., doing a series of trades that earn essentially risk-free profits. Intermediaries or proprietary trading firms will pursue the arbitrage opportunities until the spreads are equalized in the two segments. If the OTC segment and the platform segment involve different exogenous costs, arbitrage will continue until the spreads in the two markets are equal after adjusting for these costs. Therefore, the liquidity generated by the platform has a positive externality on OTC markets.

243. To use an analogy, the emergence of the platform is like building an additional reservoir. If the old reservoir is connected to the new one by an underground tunnel, excess rain collected by either reservoir also provides liquidity to the other. In this analogy, Prof. Hendershott's argument is akin to building a new reservoir with a cover—it does not collect new liquidity but only diverts water from the old reservoir, hence negative liquidity externality. In the stock loan context, the platform adds substantial new liquidity, so the externality is likely positive.

244. The above discussion highlights two key shortcomings of theoretical models behind the “liquidity externality” argument. For example, Prof. Hendershott cites an influential theoretical paper, Pagano (1989),²⁵⁸ in the footnote. The paper considers a market structure in which two identical exchanges operate in parallel, and traders choose which one to go to. An

²⁵⁸ See Hendershott Rpt. ¶ 366 n.755 (citing Marco Pagano, *Trading Volume and Asset Liquidity*, 104 Q.J. Econ. 255 (1989)).

important restriction of the model is that no one can trade in both markets. Another critical restriction is that the two exchanges are identical, so the only effect of having multiple exchanges is to split up the market without bringing in additional trading activity. These theoretical restrictions are clearly counterfactual in the stock loan market.

245. As discussed *infra*, Prof. Hendershott also cites a “prominent market structure textbook” for the proposition that “[w]ithin any given market structure, liquidity is greatest and transaction costs are lowest when all traders trade in that structure.”²⁵⁹ But Prof. Hendershott omits that the same “prominent market structure textbook” explains “[m]arket diversity, however, does not necessarily imply inferior price formation and high transaction costs. Traders can obtain the benefits of consolidation in fragmented markets when information flows freely between market fragments, and when some traders can choose which fragment in which to trade.”²⁶⁰ As there are no reasons why information would not flow freely in this market between platforms and the but-for OTC segment, it is not plausible that the OTC segment would be worse off in the but-for world.

246. I expect large broker-dealers—bank-affiliated or not—to be active participants in the OTC segment and the platform segment of the stock loan market. I would expect the same for sophisticated hedge funds. In addition, the platform would typically have a lower spread and will attract additional market participants who find the OTC spread too wide. As discussed above, the combination of new liquidity brought by the platform and the cross-market arbitrage will move the OTC prices closer to platform prices, to the benefit of all end users.

²⁵⁹ Hendershott Rpt. ¶ 365 (quoting Harris, *supra* note 5, at 533).

²⁶⁰ Harris, *supra* note 5, at 533.

247. Third, dealers' profit margin in the stock loan market is large enough so they can afford to lose some profit margin while maintaining the same service. Customers' transaction cost in the OTC market is the sum of dealers' cost of providing liquidity plus the dealers' profit margin. As I discuss above, dealers' costs of providing liquidity in the stock loan market service are likely to go down due to the extra liquidity generated by the platform. Additionally, a successful platform puts a strong competitive pressure on the OTC segment and forces dealers to reduce their profit margin to keep market share. The high profitability of the stock loans leaves ample room for such adjustment. Thus, overall, end users staying in the OTC segment receive better prices after platform entry.

248. I have just elaborated three reasons why customers who stay OTC also benefit from the entry of a platform. Let me now turn to the empirical papers that Prof. Hendershott cites in this section. A key observation across the board is their use of the term "liquidity." For the purposes of my analysis, the relevant measure of liquidity is customers' transaction costs.

249. Amihud, Lauterbach, and Mendelson (2003)²⁶¹ conduct event studies for the expiration of deeply in-the-money warrants. Such warrants are similar to stocks, but they are separate instruments. Once the warrants are exercised and converted into stocks, there is a single instrument. The authors find that after the warrants expire, trading volume in the stock goes up, and the autocovariance of returns goes up. Prof. Hendershott refers to the evidence as "improves liquidity," but a higher trading volume or autocovariance of stocks is not directly linked to

²⁶¹ See Yakov Amihud et al., *The Value of Trading Consolidation: Evidence from the Exercise of Warrants*, 38 J. Fin. & Quantitative Analysis 829 (2003).

transaction costs.²⁶² Hence, I believe the evidence of this paper has nothing to do with the impact of platform competition for the stock loan market.

250. Hendershott and Jones (2005)²⁶³ studies an episode in 2002 during which the Island ECN stopped displaying limit orders in three active ETFs, lost market share, and experienced higher transaction costs. Prof. Hendershott attributes the higher transaction cost to the lost market share, but a more natural explanation of the higher transaction cost is that Island ECN became less transparent. Indeed, the title of the paper, coauthored by Prof. Hendershott, is “Island Goes Dark: Transparency, Fragmentation, and Regulation.” If anything, the evidence shows the negative consequences of pre-trade opacity on market quality.

251. Barclay and Hendershott (2004)²⁶⁴ find that trading cost in the U.S. stock market is higher after the regular trading hours than during the trading hours. Their data sample is from March to December 2000. While they interpret the findings as evidence supporting “liquidity externality,” the comparison between trading hours and off-trading hours is very different from the cross-trading-venue comparison.

252. Holden, Lu, Lugovskyy, and Puzzello (2021)²⁶⁵ look at an experiment in the Chinese FX market. It is a very special setting because the Chinese capital market is generally subject to heavy government intervention, and the Chinese FX market is specifically affected by

²⁶² See Hendershott Rpt. ¶ 365 (citing Yakov Amihud et al., *The Value of Trading Consolidation: Evidence from the Exercise of Warrants*, 38 J. Fin. & Quantitative Analysis 832 (2003)). The authors interpret a higher return autocovariance as narrower bid-ask spread, but it is not warranted. A highly positive autocovariance suggests that high past returns predict high future returns, and this pattern is often associated with higher bid-ask spreads.

²⁶³ See Terrence Hendershott & Charles M. Jones, *Island Goes Dark: Transparency, Fragmentation, and Regulation*, 18 Rev. Fin. Stud. 743 (2005).

²⁶⁴ See Michael J. Barclay & Terrence Hendershott, *Liquidity Externalities and Adverse Selection: Evidence from Trading After Hours*, 59 J. Fin. 681 (2004).

²⁶⁵ Craig W. Holden et al., *What is the Impact of Introducing a Parallel OTC Market? Theory and Evidence from the Chinese Interbank FX Market*, 140 J. Fin. Econ. 270 (2021).

capital control in a material way. Conclusions from this paper are too special to be applied in the U.S. stock loan market setting.

B. Small Class Members Were Impacted by the Conspiracy

253. Profs. Hendershott and McCrary claim that small Class members were not impacted by the conspiracy because they are less likely to join a platform.²⁶⁶ In reaching their conclusions, both Hendershott and McCrary overlook the economic dynamics and the facts of this market. All Class members—including those with low shorting volumes—would have benefited from the existence of a trading platform, even if they chose to continue trading over the counter.

254. Profs. Hendershott and McCrary acknowledge that, in the but-for world, platform prices would discipline OTC prices if platform trading is a viable outside option (i.e., a credible threat) to OTC trading.²⁶⁷ This is consistent with my opening report, the opening report of Profs. Asquith and Pathak, and the economic literature.²⁶⁸ An end user would use any viable outside option to credibly threaten a reduction in the bilaterally negotiated price charged by their prime broker.²⁶⁹ Without such an option, the prime broker exerts a temporary monopoly over the end

²⁶⁶ Hendershott Rpt. § V.D; McCrary Rpt. ¶ 102.

²⁶⁷ See Hendershott Rpt. ¶ 359 (suggesting that an outside option provides bargaining leverage); McCrary Rpt. ¶ 102 n.113 (“[E]conomists generally model the outcomes of negotiations between parties as depending *only* on the payoffs the parties would obtain should they fail to reach an agreement—*i.e.*, on the parties’ outside options—and on the payoffs the parties could obtain by reaching an agreement.”).

²⁶⁸ Zhu Rpt. ¶¶ 282-86; Expert Report of Paul Asquith & Parag Pathak ¶¶ 288-89, ECF No. 414-10 (“Asquith & Pathak Rpt.”); John Nash, *Two-Person Cooperative Games*, 21 *Econometrica* 128 (1953).

²⁶⁹ See Haoxiang Zhu, *Finding a Good Price in Opaque Over-the-Counter Markets*, 25 *Rev. Fin. Stud.* 1255, 1257-58 (2012)

user and charges the monopoly price.²⁷⁰ All experts in this case appear to agree that this mechanism of impact could affect this market, provided that a viable outside option is present.

255. To avoid the economic conclusion that *all* Class members were impacted given the lack of a viable platform option, Profs. Hendershott and McCrary argue that platform trading is not a viable outside option for some borrowers, principally borrowers with low shorting volumes.²⁷¹ They reason that the fixed costs of connecting to such a platform outweigh the benefits for small borrowers, and therefore that these borrowers cannot use the existence of a platform as a credible threat.²⁷² This reasoning makes several mistaken assumptions and fails to understand the full impact of a platform in the but-for world.

1. *Small Class Members Could Leverage Platform Pricing to Switch to Other Brokers*

256. In paragraphs 359-362, Prof. Hendershott argues that platform trading would not have been a viable outside option for many Class members. He used Torus as an example. But as far as I understand, Torus switched its prime broker from [REDACTED] to [REDACTED]²⁷³ so Torus' experience is actually evidence that small short sellers have the ability to switch to a different prime broker if the current one does not offer competitive pricing.

²⁷⁰ Prof. Hendershott appears to acknowledge that in the existing market structure, the prime brokers currently charge a monopoly price. *See, e.g.*, Hendershott Rpt. ¶ 360 (“A prime broker negotiating with such a class member would have had no incentive to discount its prices simply because a trading platform existed if that class member could not have credibly threatened to use the platform.”).

²⁷¹ *See* Hendershott Rpt. ¶¶ 359-60; McCrary Rpt. ¶ 102.

²⁷² *See* Hendershott Rpt. ¶ 360 (“Torus is [REDACTED]
[REDACTED] . . . Class members in Torus' position presumably would not have joined AQS and could not have credibly threatened to transact on AQS to try to leverage price concessions from their brokers.”).

²⁷³ *Simeone Tr.* 256:6-10 (“Q. I think we discussed that at some point Torus replaced [REDACTED]
[REDACTED] as its prime broker? A. Yes, we have.”)

257. More generally, a customer's outside option, or the customer's action to seek outside options, is unobservable to prime brokers, and it is in the interest of the customer to keep this information private. Even if a customer stays with a prime broker temporarily, the potential threat of going to a different prime broker later keeps the current broker in check. And that implicit threat of changing shop is the very reason that intermediaries are not extracting the full surplus in many economic models of search such as in my paper with Duffie and Dworczak and references cited there.²⁷⁴

258. To elaborate this point, let's ask the question: does an end user receive any economic surplus from the current prime broker in the stock loan market? If the answer is yes, then the end user must have some bargaining power against the prime broker, and the only reason that the end user has any bargaining power is that it may switch to a different prime broker. If the answer is no, i.e., the prime broker extracts all economic surplus from the end user, then what is there to lose for the end user to contact the platform? After all, it is impossible to do worse than a zero surplus. For any end user, no matter how small or inactive it is, approaching the platform is always an outside option. Some end users may do so with 100% probability, some 50%, some 1%, etc., but the probability is always positive from the prime broker's perspective. As I discuss, the platform is likely to adjust its pricing to end users so that gains from trade—no matter how small—are harvested by the end user.

259. Prof. Hendershott argues that certain end users may have preferences that are so dogmatic and lexicographical that they would never use the platform—regardless of the price. That argument is illogical. If standard economics teaches us anything, it is that there is a price to

²⁷⁴ Darrell Duffie, Piotr Dworczak, & Haoxiang Zhu, *Benchmarks in Search Markets*, 72 J. Fin. 1983 (2017).

clear demand and supply. For example, take an end user that is supposed to value the “relationship” with a prime broker. There is a price for this relationship, as Prof. Hendershott himself recognizes when mentioning that an end user can purchase the service “à la carte” elsewhere in his report.²⁷⁵ For the sake of illustration, suppose the consumer believes the fair price of the relationship is 5 bps of loan balance per year. Would the end user stay OTC if the platform price is 10 bps better than OTC price? Obviously, $10 > 5$, so the rational end user would forgo the “relationship” and switch to a platform. Every single item of Prof. Hendershott’s list in paragraph 361 (except (d) and (e), which I address separately below) is subject to the same logical flaw. To use an analogy, Prof. Hendershott is arguing that consumers who like blue would pay any price to get a blue car, even if otherwise identical cars are available in different colors at much, much lower prices. Even if such a consumer existed, it would be utterly unwise if he/she disclosed such preference to the car dealers who can exploit this information.²⁷⁶

260. In item (d) of Prof. Hendershott’s list in paragraph 361, he argues that platform fees are too high for certain Class members. But it is a common market practice to give deep discounts to small institutions or free access for a period. For example, the U.S. interest rate market is undergoing a major switch from LIBOR to the Secured Overnight Financing Rate (“SOFR”). The CME Group has produced a “term SOFR rate” that is formally endorsed by the official sector. Yet, CME is licensing its term SOFR rates for use in loan and bond markets for

²⁷⁵ See Hendershott Rpt. ¶¶ 347, 444.

²⁷⁶ Prof. Hendershott [REDACTED] at his deposition. Hendershott Tr. 52:20-54:25 (testifying that [REDACTED]).

free until December 2026.²⁷⁷ Its fee schedule for licensing term SOFR for hedging in the swaps market is under development. According to the Alternative Reference Rate Committee, as of March 2021, the USD LIBOR derivatives market has \$214 trillion outstanding, whereas the USD LIBOR loan and bond markets have \$9 trillion outstanding. Therefore, the economics behind CME's pricing strategy is very clear: they give free or low-cost access to the term SOFR rates to the small bond and loan segment of LIBOR market and aim to make more revenue in the much larger derivatives segment.²⁷⁸ This is an example of a flexible market fee structure that takes into account the heterogeneous circumstances of customers. Likewise, as mentioned in other parts of my reply, if AQS were not boycotted, its fee structure would have adjusted to meet market demand. I expect that the but-for fee schedule of AQS would involve giving low-cost access to small market participants.

261. Finally, Prof. Hendershott's item (e) in his list of paragraph 361 argues that certain stocks may not be available on the platform. Note that the proper level of discussion is at the end-user level, not the stock level nor the trade level. To use an analogy, the subway and commuter rail system does not cover every corner of a metropolitan area, but I have yet to meet a single person in New York or London who has never used the train system in his/her life. In this sense, the trains do not entirely replace driving, biking, or walking, but it is beneficial to all residents of the city. Likewise, a stock loan platform does not need to cover all stocks or all

²⁷⁷ See CME Group, *CME Term SOFR Reference Rates* (2021), <https://www.cmegroup.com/market-data/files/cme-term-sofr-reference-rates-faq.pdf>. The bond market is sometimes referred to as the "cash" market.

²⁷⁸ See The Alternative Reference Rates Committee, *Progress Report: The Transition from U.S. Dollar LIBOR*, tbl. 1 (2021), <https://www.newyorkfed.org/medialibrary/Microsites/arrrc/files/2021/USD-LIBOR-transition-progress-report-mar-21.pdf>.

trades, but as long as it provides an outside option for some stocks and some trades, all end users will still find it useful.

262. The existence of a platform leads to the publication of a benchmark in that it “allows traders to decompose a price offer into a common-cost component and a dealer-specific component for cost and profit margin.”²⁷⁹ Using the platform price, small borrowers could negotiate with a different broker to receive a lower dealer-specific price. This outside option is credible even under Profs. Hendershott and McCrary’s analysis, because it comes with no associated fixed annual fees.

263. To the extent that Profs. Hendershott or McCrary argue that other brokers would not offer a lower price because they too know that the platform is not a viable outside option for a certain borrower, that argument is premised on an economically unreasonable assumption of perfect information.²⁸⁰ Prof. McCrary is correct that “[i]ntroducing or removing an irrelevant alternative that *clearly would not be chosen* should not affect the outcome of the negotiation,”²⁸¹ but his analysis assumes, incorrectly, that the prime broker has perfect knowledge that the outside option would not be chosen.

264. Prof. McCrary’s best argument is that the prime broker servicing the client currently has a good sense of the client’s trading patterns and financial wherewithal. But that prime broker is in a *unique* position relative to all prime brokers. All of the other prime brokers—absent collusion—would not have information about the client’s trading records, and therefore cannot make informed judgments about the client’s ability to use a trading platform.

²⁷⁹ Darrell Duffie, Piotr Dworczak, & Haoxiang Zhu, *Benchmarks in Search Markets*, 72 J. Fin. 1983 (2017) at 1985.

²⁸⁰ See Hendershott Rpt. ¶ 360; McCrary Rpt. ¶¶ 102 & n.113, 189, 202-05.

²⁸¹ McCrary Rpt. ¶ 102 n.113 (emphasis added).

Thus it is not the case that a platform “clearly would not have been chosen” for smaller Class members—to most prime brokers, the client is just a prospective source of business that they would offer terms to assuming the presence of a platform. And with this competitive introductory rate, the borrower can then negotiate down its existing broker.

2. *A Platform in the But-For World Is Viable for Small Borrowers*

265. A second reason that small Class members are impacted is that multilateral trading platforms **are** viable options for them to use, and thus present a credible threat even to a prime broker with perfect information of the client’s trading records. For example, the evidence shows Torus actively sought out platform options in stock lending and otherwise,²⁸² contradicting Defendants’ assertion that Torus “could not have credibly threatened to transact on AQS”²⁸³—Torus **was** actively seeking to participate in platforms and certainly would have used that fact in its negotiations with prime brokers.

266. Profs. Hendershott and McCrary use real-world shorting volume and real-world platform pricing to assert that a platform would not be viable for small borrowers in the but-for world.²⁸⁴ But real-world shorting volume and real-world platform fees are not informative of the but-for world, as both are tainted by the conspiracy.

267. *First*, Profs. Hendershott and McCrary implicitly assume that borrowers’ rate of short selling will not increase in the but-for world. But as I have demonstrated in my academic

²⁸² See, e.g., Riggio Tr. 75:5-19 (“Q. You said it is potentially a problem once you're in an option position, if you're not able to borrow stock to hedge that position, right? A. That's correct. It would have been nice to have a platform where, yeah, we were only dependent on [REDACTED] to borrow stock, when I was up the last two years, when I was up trading stock and options. It would have been nice to have a market where it would have been a fair and orderly market to see and get the borrows from other places than just [REDACTED] our home broker.”); Riggio Tr. 163:20-164:4; Riggio Tr. 194:18-195:4; Riggio Tr. 213:2-21.

²⁸³ Hendershott Rpt. ¶ 360.

²⁸⁴ See *id.* §§ IV.C.3, V.D; McCrary Rpt. ¶ 102 & n.113.

work, increased transparency induces greater participation in the market.²⁸⁵ Higher output, in turn, increases the benefit that a borrower would receive by switching to a platform. Defendants' experts hold output constant in determining that small borrowers are not impacted. For instance, Prof. Hendershott argues that Torus could not have credibly threatened to join AQS because "[REDACTED]

[REDACTED] . . . [therefore Torus] could not have credibly threatened to transact on AQS to try to leverage price concessions from their brokers."²⁸⁶ But Torus' shorting volume in the real world is suppressed by Defendants' conspiracy; in the but-for world, Torus' better access to borrows at better prices would increase its shorting volume.²⁸⁷ As the testimony of Messrs. Nishimura and

²⁸⁵ Darrell Duffie, Piotr Dworczak, & Haoxiang Zhu, *Benchmarks in Search Markets*, 72 J. Fin. 1983 (2017) at 1985. ("[P]ublication of the benchmark encourages efficient entry by traders, thus increasing the realized gains from trade. The benchmark improves the information available to traders about the likely price terms they will face. This assists traders in deciding whether to participate in the market, based on whether there is a sufficiently large conditional expected gain from trade.").

²⁸⁶ Hendershott Rpt. ¶ 360.

²⁸⁷ Nishimura Tr. 149:6-20 ("Q. How would [an exchange in stock loan] have helped Torus? A. Well, with more transparency, we might have had -- we may have had better -- better rates on some stock we borrowed or we'd at least know what the marketplace was. We would know if there was any liquidity in certain things. We would know -- I mean, the liquidity -- transparency and liquidity would have been great -- would have been helpful, and also just the ability to borrow stock sometimes, it would have made trades feasible. If you could put out, okay, I'm looking for stock, and who knows? Someone might -- sometimes you don't know whether -- whether -- if no one knows you have a bid out there, no one can hit it. You know, it's the same -- same idea."); Riggio Tr. 104:22-106:2 ("Q. And it was important to have the ability to borrow stock to execute these strategies regardless of how much it cost to borrow? . . . A. The more it cost, that factors into your -- the trade. Every little thing matters. So getting the best price in anything, especially in stock, to get the lowest price available is what you would want in a fair and orderly market. You want to get -- it would have been nice to have an exchange or somewhere to have that so we could compare the -- the -- the interest or whatever you want to say per day of what you were getting charged to borrow stock. Q. You were never aware of any place that that capability existed, right? . . . A. All I'm saying if there was, I was not aware of anyplace where you could do that. But if there was one, I'm sure Torus Capital would have been very interested in participating in that marketplace.").

Riggio indicate, access to a platform would have allowed Torus to make trades it otherwise could not make in the real world, at lower prices.²⁸⁸

268. *Second*, Profs. Hendershott and McCrary use the real-world subscription fees charged by AQS in determining whether switching to a platform in the but-for world would confer economic benefit on small borrowers.²⁸⁹ This analysis grossly over-estimates the cost of transacting in the but-for world. For example, [REDACTED]

[REDACTED]²⁹⁰ I have discussed above that stock loans at OCC and other international markets can be sustainable by charging modest variable fees.

269. *Third*, Profs. Hendershott and McCrary assume that a small borrowers' sponsoring broker into a platform will be bank-affiliated, and thus incur regulatory capital

²⁸⁸ See, e.g., Riggio Tr. 75:5-19 (“Q. You said it is potentially a problem once you're in an option position, if you're not able to borrow stock to hedge that position, right? A. That's correct. It would have been nice to have a platform where, yeah, we were only dependent on [REDACTED] to borrow stock, when I was up the last two years, when I was up trading stock and options. It would have been nice to have a market where it would have been a fair and orderly market to see and get the borrows from other places than just [REDACTED] our home broker.”); Riggio Tr. 163:20-164:4 (“Q. Do you know what steps you would take to get access to a central - A. Oh, we would find -- we would become a member of -- it would definitely behoove us to become a member of that, just anything -- whatever it took to get access to a fair and orderly stock loan platform, I'm pretty confident Torus would be very interested in that.”); Nishimura Tr. 97:7-98:3 (“Q. Did you ever -- do you know if anyone at Torus asked your prime brokers for access to such services? A. I think the only thing we might have asked for is if there were a better way we could go out and locate stock. I think, particularly, when we were trying to trade these -- these preferreds, and it was very restrictive on our ability to actually trade them, you know, because we were running into brick walls all over the place, trying to -- trying to locate stock. You know, this -- this is an occasion where -- where if such a thing existed, it wouldn't have been very helpful because we -- it -- it was a -- not a position in which we could say, okay, we ended up wasting a lot of time because we'd end up with -- with dead ends. And if -- I'm -- I'm sure there were -- there were indications where we would be happy to lend the stock if they knew that we were looking to borrow it, but they -- there was no market for us to borrow it.”).

²⁸⁹ See Hendershott Rpt. § IV.C.3; McCrary Rpt. § 3.5.1.

²⁹⁰ [REDACTED] Decl. ¶¶ 7-9.

Highly Confidential

charges.²⁹¹ This is incorrect. Particularly for small borrowers whose trading activity does not take much balance sheet space, a non-bank-affiliated broker-dealer is more likely to provide more competitive pricing and become its sponsoring broker. Broker-dealers such as [REDACTED] and [REDACTED] both already members of the OCC,²⁹² could have provided sponsored access to a platform without incurring those bank regulatory capital charges.²⁹³ Thus, their sponsorship fees would have been lower and more affordable for small borrowers. Torus is exemplar of this dynamic; it began using [REDACTED] in 2017.²⁹⁴

²⁹¹ See Hendershott Rpt. ¶¶ 244, 251, & Appendix C; McCrary Rpt. ¶ 177.

²⁹² *OCC Member Directory*, OCC, (last visited Sept. 30, 2021).

²⁹³ See 12 CFR § 217.100(b) (defining which entities are subject to Basel III regulation).

²⁹⁴ Simeone Tr. 326:12-23.

V. MY OPENING REPORT SETS FORTH A RELIABLE ECONOMIC METHODOLOGY FOR DEMONSTRATING CLASSWIDE IMPACT

270. In their expert reports, Profs. McCrary and Hendershott make several specific arguments about my search model and supporting yardstick analysis. In this section I respond to these specific critiques and explain why they have no merit.

A. My Economic Search Model Shows Classwide Impact

271. The economic search model I presented in my opening report demonstrates *all* Class members are injured.²⁹⁵ Prof. Hendershott does not meaningfully engage with this analysis directly; he instead makes oblique and tangential remarks on the underlying assumptions that were analyzed in Sections III and IV regarding purported fundamental differences of platform loans and OTC loans, purported high costs associated with platform trading, an alleged liquidity externality that could harm the OTC segment, and arguments regarding certain discrete categories of Class members.

272. The only expert that **does** engage with my economic search analysis directly is Prof. McCrary, and the rest of this part of my reply responds to his points. Prof. McCrary generally acknowledges the underlying intuition of my approach, presenting a user-friendly and intuitive description of the search model mechanism in his “balls from a box” discussion.²⁹⁶ Prof. McCrary’s analysis, however, ultimately makes fundamental errors.

273. First, Prof. McCrary claims that my search model does not apply to the stock loan market because prime brokers allegedly have some knowledge about which clients are multi-primed, stating my “assumption that prime brokers **know little** about their short selling clients is critical to [my] claim of having shown common harm.”²⁹⁷ To be clear, my economic search

²⁹⁵ Zhu Rpt. ¶¶ 258-89.

²⁹⁶ McCrary Rpt. ¶¶ 232-33.

²⁹⁷ *Id.* ¶ 236 (emphasis added).

Highly Confidential

model requires only that prime brokers have **incomplete** knowledge about the outside options of end-user clients. Even if a prime broker is 99% confident that a client is not being approached by a rival prime broker or a trading platform, the remaining 1% uncertainty makes this inference incomplete, and that 1% uncertainty is enough for the model to be reliably applied to the stock lending market. Prof. McCrary's analysis only makes sense if he proves to a degree of economic certainty that prime brokers have **perfect knowledge** of their clients' trading opportunities. That is not plausible.

274. Prof. McCrary is even more off base when he attacks my model by arguing the prices offered by prime brokers [REDACTED]

[REDACTED]

[REDACTED]²⁹⁸ Prof. McCrary fails to realize that the price distributions in my model are conditioned on all observables—a standard economic technique. I explained how that concept works at my deposition:²⁹⁹

[REDACTED]

[REDACTED]

²⁹⁸ *Id.* ¶ 241 (quoting and citing [REDACTED]).

²⁹⁹ Zhu Tr. 251:23-253:20.

275. After I explained this technique, the questioner himself confirmed a correct understanding of how it works.³⁰⁰

[REDACTED]

[REDACTED]

276. Going back to the “knowledge” issue, the core economic principle is that, conditional on the observable characteristics of clients, prime brokers have incomplete information about unobservable characteristics. Let me use the analogy of searching for a mortgage loan. Observable characteristics of mortgage borrowers include their income, assets, and credit score, among others. Conditional on similar income, assets, and credit score, no lender knows for sure if the borrower is talking to other lenders—that action (or lack thereof) is unobservable. Indeed, whether a mortgage lender offers a lower interest rate or closing cost to a customer often depends on whether the customer has other quotes from competitors. In my own experience, mortgage lenders are happy to match competitors’ interest rates or beat them by a narrow margin. Likewise, in the stock loan market, although a client’s revenue, size, number of prime brokers, etc., are observable, once we condition on these observables, a prime broker cannot know the unobservable information, such as whether the client is talking to other prime brokers or accessing platforms.

277. Relatedly, Prof. McCrary argues that my model must be unreliable because [REDACTED]
[REDACTED]³⁰¹ In particular, he argues [REDACTED]

³⁰⁰ *Id.* at 253:9-20.

³⁰¹ McCrary Rpt. ¶¶ 244-47.

³⁰² Prof. McCrary then claims that because of this difference, my model “cannot be evidence for the assertion that there would have been common benefit to class members from the expansion of platform trading.”³⁰³

278. But the difference between the model price distributions and the real-world data reflects a feature rather than a bug. As mentioned above, conditioning analysis on observable factors ensures that you isolate the cause-and-effect relationship you want to study. Analyzing the **raw** transactional data like Prof. McCrary proposes would, to the contrary, inevitably **add** error to the analysis. While Prof. McCrary is certainly correct that [REDACTED]

”304

279. To see the importance of this distinction, let us revisit the analogy of mortgage lending. The empirical distribution of interest rates across all mortgage loans is mostly determined by the distribution of observable characteristics of borrowers such as their income and credit scores. If the pool of borrowers has a wide range of credit scores of, say, 500 to 850, we also expect to see a wide range of the interest rates on their loans, say from 2% to 6%. This unconditional distribution of mortgage interest rates

However, conditional on a particular range of credit score, say from 740 to 760, the associated range of interest rates would be much narrower, say between 2.25% and 2.75%.

302 *Id.* ¶ 245.

303 *Id.* ¶ 247.

304 *Id.* ¶ 241 (quoting and citing [REDACTED]).

280. Now suppose that people with lower credit scores talk with more lenders than people with higher credit scores do. If one were to analyze the raw data, i.e., the 2% to 6% range data, one would erroneously infer that rigorously searching for multiple loan quotes leads to a *higher and worse* interest rate—those that searched around rigorously happened to be the individuals with lower credit scores, and therefore those that received overall higher rates. This clearly would be an incorrect inference to draw, and it shows the danger of lumping all data together, as Prof. McCrary proposes.

281. In contrast, suppose that conditioning on the 740 to 760 credit range, it turns out that those that rigorously searched for quotes ended up closer to 2.25% while those that did not ended up closer to 2.75%. This lines up with intuition, and better captures the correct economic inference—that searching for quotes will have some causal effect on your mortgage rate within a range, but surely your raw credit score matters more by determining that broad range. This shows conditioning analysis on observables makes an analysis *more* reliable.

282. This narrower distribution of interest rate is analogous to my plot of prices implied from the search model. Viewed this way, it is not surprising at all that the unconditional distribution of prices in Exhibit 21 of Prof. McCrary's report is [REDACTED]

[REDACTED] This difference is, in fact, desirable and expected.

283. The conceptual distinction between conditional distribution and unconditional distribution can also be seen from a mathematical theorem known as the law of total variance,

which is taught in undergraduate-level probability statistics classes.³⁰⁵ The theorem states that, for two random variables X and Y ,

$$\text{Var}(Y) = E(\text{Var}(Y|X)) + \text{Var}(E(Y|X)).$$

284. To be more concrete, let Y be the price of stock loans and let X be the size of the client (one of the observables). The theorem is rewritten as:

$$\text{Var}(\text{Price}) = E(\text{Var}(\text{Price} | \text{Client size})) + \text{Var}(E(\text{Price} | \text{Client size})).$$

285. The expectation and variance on the right-hand side of this equation are taken over the distribution of client sizes. In this equation, the left-hand side is the variance of all observed prices, $\text{Var}(\text{Price})$. [REDACTED]

[REDACTED] Much of this variance, or price dispersion, is driven by the second term on the right-hand side, $\text{Var}(E(\text{Price} | \text{Client size}))$, which is the dispersion in the average price received by clients of different sizes. The plot of price distribution implied from the search model is more about the first term, $E(\text{Var}(\text{Price} | \text{Client size}))$, i.e., the expected dispersion of prices conditional on a particular (narrow range of) client size.

286. In sum, the search model should be interpreted as conditional on observable characteristics. Conditional on similar characteristics, dealers cannot tell fast end users from slow ones. Increasing the fraction of fast end users via the introduction of the platform will improve the prices received by every end user.

287. As I explained in my opening report, the market structure embedded in the search model—dealers remain liquidity providers and customers obtain quotes from a wider set of

³⁰⁵ See, e.g., MIT OpenCourseware, *Introduction to Probability Lecture 13: Conditional expectation and variance revisited* at Slides 6-8, available at https://ocw.mit.edu/resources/res-6-012-introduction-to-probability-spring-2018/part-i-the-fundamentals/MITRES_6_012S18_L13AS.pdf.

dealers via the platform—is likely an intermediate state of market evolution. From that point on, the market may well evolve into a shape and form that resemble today’s U.S. equity markets, in which non-dealers and customers can also provide liquidity to each other. The latter market structure is closer to the model envisioned by Profs. Asquith and Pathak when they calculate damages. There is nothing inconsistent between my model and theirs because one evolves from the other. Prof. McCrary has mischaracterized the two models as conflicting, rather than complementary.

288. Prof. McCrary also argues that the fee for GC borrowing could be based on long-term contracts, under which the rates are fixed for a period of time.³⁰⁶ Whether prices are determined trade by trade, or groups of trade by groups of trade, does not change the nature of the issue, which is insufficient competition in the OTC market structure. Due to search costs in OTC markets, a client looking for a long-term contract cannot get quotes from all prime brokers, leading to prices that are not fully competitive. Adding a platform benefits the client by giving it access to more prime brokers, other liquidity providers, and fellow end users. The benefit applies regardless of whether the client seeks to execute one trade or a collection of trades.

289. Section 4.3 of McCrary report focuses on beneficial owners. He reiterates the point that prime brokers know which beneficial owners transact with multiple counterparties, and my response above remains valid here: the search model applies conditional on observables such as the client’s size and number of counterparties.

290. He also interprets the search model too narrowly, even incorrectly, by restricting what “search” means. Specifically, he argues that beneficial owners do not search for prime brokers; prime brokers search for beneficial owners.

³⁰⁶ McCrary Rpt. ¶ 243.

291. This detail is inconsequential. For example, when a customer shops for a car, does it matter if the customer calls car dealerships or dealerships calls the customer? Of course not. Regardless of who starts the conversation, it is a back-and-forth negotiation. The exact details of the conversation do not change the fact that the customer seeks liquidity, and the dealers provide liquidity. The same applies to stock loans.

292. Moreover, in the OTC market of stock loans, “search cost” is not the telephone bill; it is the cost incurred by end users to get a new prime broker, including setting up legal documentation and operational procedures, so that the end user can trade with the new broker. On a multilateral trading platform, the end user can trade with everyone on the platform, which means the cost of adding an extra counterparty shrinks dramatically to close to zero. The end user only needs a prime broker, which the end user already has, to help connect to the platform. Therefore, the economic search model used in my opening report is appropriate for analyzing the evolution of the stock loan market.

B. My Yardstick Analysis Supports a Showing of Classwide Impact

1. *Multilateral Trading Thrives in Non-U.S. Stock Lending Markets*

293. Prof. Hendershott argues that stock loan markets in other countries such as Brazil, Japan, Taiwan, and Korea should be taken as yardsticks of U.S. stock loan markets. He concludes that evidence in these markets shows central clearing and multilateral trading would not be viable in the United States stock lending market.³⁰⁷ But because stock markets in these countries are significantly smaller than the U.S. stock market, such international evidence should be interpreted as a lower bound of what is possible in the U.S. market. Indeed, underlying all of Prof. Hendershott’s non-U.S. arguments is a logical flaw: central clearing and multilateral

³⁰⁷ Hendershott Rpt. ¶¶ 174-78.

trading in the (very large) U.S. stock loan market is possible only if such business models are successful in other (much smaller) capital markets. To use an analogy, if a 10-year-old child can lift a bucket of water, it is only reasonable to expect that a fully grown adult can lift the same bucket of water. It is not logical to claim the reverse as Prof. Hendershott does, i.e., a grown adult can lift a bucket of water only if most small children can do the same.

294. I reviewed additional evidence of stock loans in countries that are not covered thoroughly in my initial report and find that the central clearing and multilateral trading of stock loans have been implemented successfully in many other countries with significantly smaller capital markets. Because what is possible in smaller markets serve as a lower bound of what is possible for the U.S., I conclude that such business models are also viable in the U.S. stock loan market. In addition, evidence in other markets also confirms other aspects of my economic analysis, including the very low technological cost of implementing central clearing and multilateral trading.

(a) Taiwan

295. Chen (2016) provides a detailed analysis of the Taiwan stock loan market.³⁰⁸

There are three segments, which I reproduce below in the table.

Chen (2016) definition	TWSE definition	Centrally cleared?	Multilateral?	Pre-trade transparency	Post-trade transparency
Transparent	Competitive bid	Yes	Yes	Yes	Yes, immediate
Semi-transparent	Negotiated	No	No	No	Yes, immediate
Opaque	Brokered	No	No	No	Yes, daily summary

³⁰⁸ Linquan Chen, Essays on the Role of Short Selling in Financial Markets (Feb. 2016) (Doctoral Thesis, University of Warwick) (on file with the University of Warwick Publications Service & Warwick Research Archive Portal), http://wrap.warwick.ac.uk/77694/1/WRAP_THESIS_Chén_2016.pdf.

296. A closer look into the numbers reveals that the vast majority of all stock loan transactions are conducted by “foreign professional institutional investors,” whereas the local Taiwanese institutions predominately use the exchange mechanism. The following chart, taken from the original Chinese language presentation of the Taiwan Stock Exchange, shows the breakdown of various types of lenders and borrowers in the two segments, as of the first half of 2018:

二、借貸交易人分析- 債券餘額分析

競價債券人以外資與證券商較多
競價出借人以信託業與保險業較多
議借出借、債券則均以外資較多

競價債券人身份別	占總成交總值 %	競價出借人身份別	占總成交總值 %	議借債券人身份別	占總成交總值 %	議借出借人身份別	占總成交總值 %
外國專業投資機構	0.88%	保險業	1.98%	外國專業投資機構	90.97%	保險業	0.00%
證券自營商	0.53%	銀行或信託投資公司	0.00%	證券自營商	0.12%	銀行或信託投資公司	0.00%
期貨自營商	0.03%	外國專業投資機構	1.02%	期貨自營商	0.01%	外國專業投資機構	91.15%
證券借貸專戶	7.15%	證券投資信託事業	0.05%	證券借貸專戶	0.30%	證券投資信託事業	0.27%
國內一般法人	0.00%	證券自營商	0.03%	國內一般法人	0.00%	證券自營商	0.00%
合計	8.59%	政府基金	0.18%	合計	91.41%	政府基金	0.00%
		信託業	3.90%			信託業	0.00%
		證券借貸專戶	0.91%			證券借貸專戶	0.00%
		融資融券擔保品專戶	0.51%			融資融券擔保品專戶	0.00%
		合計	8.59%			合計	91.41%

資料期間：2018/1/2-2018/6/29

297. Below I translate and reorganize the same table (ignoring institution types that conduct 0% of the transactions). As shown, foreign institutional investors account for the vast majority of stock loan transactions (over 90%). Given that stock loans in the United States are predominantly OTC, it is not surprising that foreign investors in Taiwan use the same mechanism.

Highly Confidential

Borrowers	Exchange	OTC	Lenders	Exchange	OTC
Securities brokers	0.53%	0.12%	Insurance	1.98%	0.00%
Futures brokers	0.03%	0%	Securities trust	0.05%	0.27%
Securities financing accounts	7.15%	0.3%	Securities brokers	0.03%	0.00%
			Government funds	0.18%	0.00%
			Trusts	3.9%	0.00%
			Securities financing accounts	0.91%	0.00%
			Securities financing collateral accounts	0.51%	0.00%
Foreign professional institutional investors	0.88%	90.97%	Foreign professional institutional investors	1.02%	91.15%

298. There is a strong taxation reason why foreign investors prefer to trade OTC, away from the onshore Taiwan market. According to the Asia Pacific Securities Lending Market User Guide 2020:

“SBL fees are considered Taiwan-sourced income and are subject to income tax as well as business tax. The Tax Authority further clarified that when both parties are FINIs without permanent establishments in Taiwan, the SBL fees are outside of business tax coverage.

Regarding offshore agent fees, when all of the agency services are provided offshore, and all parties including the lender, the borrower and the offshore agent

Highly Confidential

do not have permanent establishments in Taiwan, the agent fees are not subject to income tax or business tax.”³⁰⁹

299. In other words, by trading offshore, foreign investors that do not have permanent establishment in Taiwan avoid paying taxes. The tax advantage is strong enough to sway their choice of market segment.

300. In light of these facts, the cleanest benchmark is to use the local investors’ practice. There, the exchange mechanism is clearly preferred, for both the borrowing side and the lending side. On the lending side in particular, all types except one only use the exchange mechanism. The fact that local investors in Taiwan prefer the exchange mechanism is strong evidence that a similar mechanism should be viable in the much larger U.S. stock loan market.

³⁰⁹ See Equilend et al., *Asia Pacific Securities Lending Market User Guide 2020* 93 (2020), <https://www.equilend.com/wp-content/uploads/2020/04/Asia-Pacific-Securities-Lending-Market-User-Guide-2020.pdf>.

(b) Korea

301. The Korean stock lending and borrowing market has three segments: bid-offer, arranged, and customized. A KSD presentation summarizes the three types in the following chart:³¹⁰

KSD SLB - Transaction Type

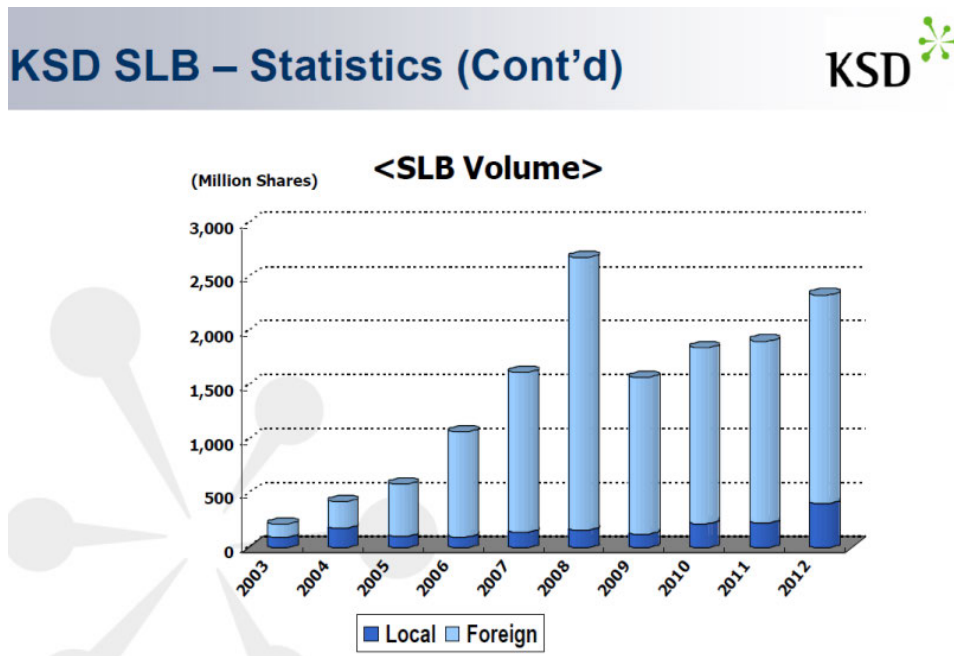
KSD

Division	Settlement Coverage	Bid-Offer	Arranged	Customized
Objective	Fail coverage	Investment strategy		
Period	3 business days	1 year		
Fee rate	Bid-offer(25% max)	Bid-offer	Decided between trade parties	
Collateral rate	100~110% according to participants credit rate			Mutual agreement
Pledgee	KSD			Lender
Early Termination	Only for borrower	- Both borrower and lender - In case of recall, the borrower must return the shares within 3 business days (4 business days for recalls after 12:00p.m.)		
Rollover	- Application and consent 3 business day prior to the maturity date - In settlement coverage transactions, application and consent is possible until the maturity date			
Partial Return	Possible			

302. As illustrated, the bid-offer and arranged segments are centrally cleared, with the Korean Securities Depository (KSD) as the CCP. The customized segment is not centrally cleared. Another difference is that the collateral rate is also customized.

³¹⁰ See Jong-Hyung Lee, *Market Booms and Busts 5*, https://www.acgcsd.org/data/acg17/Presentation/6-04_Presentation%20by%20KSD.pdf.

303. Prof. Hendershott's report notes that "over 95% of stock loan volume is negotiated bilaterally."³¹¹ But the following chart shows that the vast majority of KSD stock lending volume involves foreign participants:³¹²



304. Foreign investors from the U.S. and Europe naturally gravitate toward mechanisms that look similar to those in the U.S. and European markets, so their behavior cannot

³¹¹ Hendershott Rpt. ¶ 177.

³¹² See Jong-Hyung Lee, *Market Booms and Busts* 8, https://www.acgcsd.org/data/acg17/Presentation/6-04_Presentation%20by%20KSD.pdf.

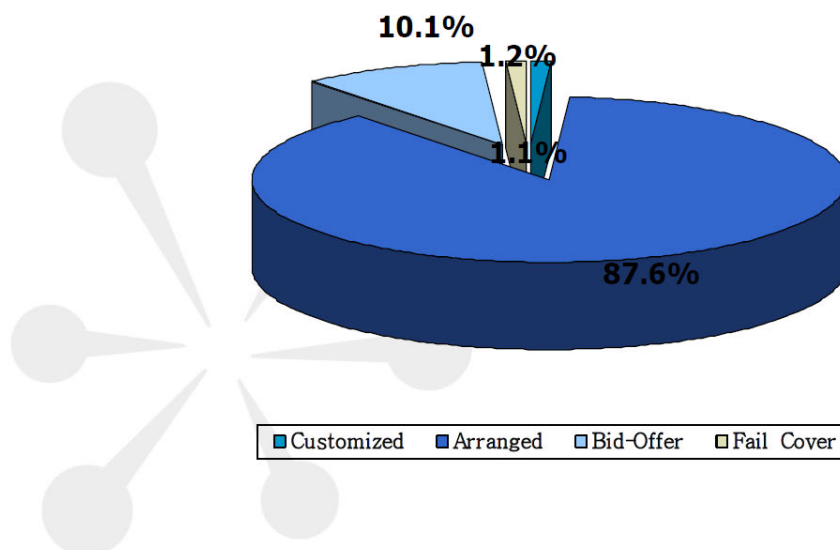
be used as independent data points. Only counting local investors, customized transactions only account for 10.1% of all transactions in 2012, shown in the below chart:³¹³

KSD SLB – Statistics (Cont'd)



Year 2012

<Local Investors>



9

237. In other words, among the local customers, almost 90% of transactions are centrally cleared in Korea. This is strong evidence that centrally clearing is a viable solution for stock loans.

(c) India

305. The National Stock Exchange (NSE) of India implements an exchange-traded mechanism of securities lending and borrowing (SLB), combined with central clearing. Their official brochure states: “In India, SLB [securities lending and borrowing] is an Exchange traded product. NSE offers an anonymous trading platform and gives the players the advantage of

³¹³ *Id.* at 9.

settlement guarantee. It provides the lender and the borrower a secured platform to transact without the worries of counter party default.”³¹⁴

306. The following series of charts, taken from the brochure, elaborates on the implementation details of this mechanism.

307. The first table below shows that Indian stock loans are traded on platforms and centrally cleared. Moreover, users can submit orders to repay (return) and recall shares, in addition to lending and borrowing.

Trading, Clearing & Settlement

Product Specifications

Particulars	Description
Platform	Automated screen based trading
Clearing	Settlement Guarantee by NSCCL
Market timings	9.15 am-3.30 pm (in line with Equities Market)
Order Types	Lend, Borrow, Recall & Repay
Trade Price (Quotes)	Lending Fees per Share
Tenures (Series)	12 Monthly contracts (*Rollover permitted)
Settlement	1st Leg: T+1; Reverse Leg: 1st Thursday of the month of the respective series
Last trade day	3 days prior to settlement day
Eligible Securities	All F&O securities + eligible Non F&O securities + Eligible Index ETF's

308. The second table below shows explicit steps for repay (return) and recall, which are permitted anytime. Importantly, the NSE of India explicitly recognizes that the economics of recalling is similar to borrowing, and that the economics of repaying (returning) is similar to lending. Under NSE’s design, the lender that initiates the recall is, in fact, initiating a new

³¹⁴ See NSE Equity, *Securities Lending & Borrowing Mechanism 2*, https://www1.nseindia.com/invest/content/SLB_brochure.pdf.

borrowing transaction elsewhere. That is, a borrower's shares are not recalled until the borrower wishes to return the shares or the contract expires, whichever happens earlier. This is an exchange-based mechanism of "recall protection."

Recall & Repay Facility

Lender	Borrower
<ul style="list-style-type: none"> Permitted to recall before the expiry 	<ul style="list-style-type: none"> Permitted to repay before expiry
<ul style="list-style-type: none"> First step is to enter recall transaction in terminal at market determined rate 	<ul style="list-style-type: none"> First step is to make early repayment of securities to NSCCL A/c. Margin will be released instantly
<ul style="list-style-type: none"> Lender's TM need to specify it as "Recall" 	<ul style="list-style-type: none"> Borrower's TM need to specify it as "Repay"
<ul style="list-style-type: none"> Market will view the transaction as regular borrow transaction 	<ul style="list-style-type: none"> Market will view the transaction as regular lend transaction
<ul style="list-style-type: none"> Custody confirmation required 	<ul style="list-style-type: none"> Custody confirmation not required
Settlement of fee as well as securities happen on T+1 day	
On successful recall / repay, existing positions are closed & investors have no obligation to settle on expiry day	

309. The third table below describes NSE's handling of corporate actions.

Treatment of Corporate Actions

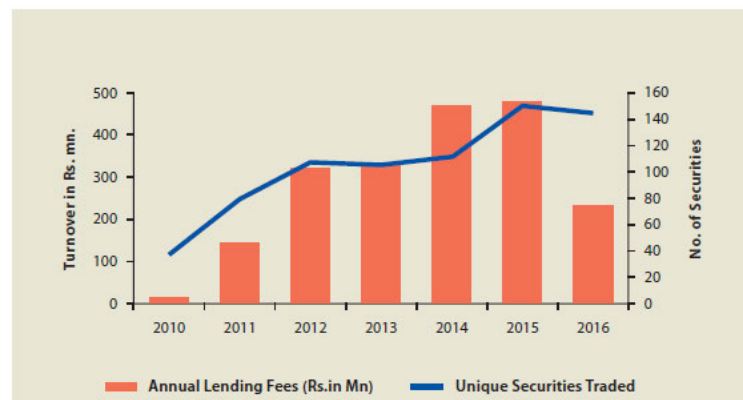
Corporate Actions	Fore-closure	Treatment	Action date
Dividend	No	Collected in cash from Borrower & passed to the Lender	Record Date +1
Stock Split	No	Outstanding position adjusted according to the split ratio	Ex-date
Bonus, AGM, Merger & Amalgamation	Yes	Proportionate lending fees collected from lender & passed to the Borrower	2 days prior to ex-date

310. Finally, the figure below shows the growth of NSE stock loans in India. The unique securities traded via this mechanism grew from just over 100 in 2010 to over 400 in 2016.

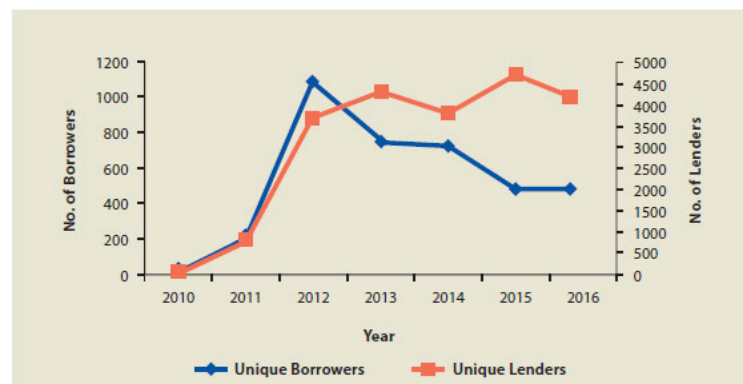
Moreover, within two years of launching the exchange-based stock loans, the number of unique borrowers reached over 1000 and the number of unique lenders reached over 800. This is strong evidence that a new business can attract a critical mass quickly.³¹⁵

Growth in SLBM Business

- Growth in the product is not limited to few parameters but in various parameters.
- This reflects that the product is moving from the introduction stage to the growth stage in the product lifecycle.



Source: NSE Data



Source: NSE Data

311. In summary, the Indian stock lending and borrowing market is based on an exchange model, with anonymous multilateral trading and central clearing. Since its launch in

³¹⁵ The Indian stock market had a strong rally from the start of 2012 to the start of 2015, which may explain why the number of active borrowers (short sellers) declined after 2012; it is likely that some short sellers were out of business due to the bull market. The total lending fee, however, grows from 2010 to 2015 before dropping in 2016.

2010, the market quickly gains transactions and continues to function well, with a large number of borrowers and lenders and a wide coverage of stocks. The exchange model can handle recalls and corporate actions. Given the Indian experience, the same mechanism is also viable in the much larger U.S. stock loan market.

(d) *Japan, Singapore, New Zealand*

312. The Japanese stock loan market has two segments: a centralized market and an OTC market. As Huszar and Prado (2019) described, the centralized market has been operational since 1977.³¹⁶ Prof. Hendershott argues that the centralized segment of the Japanese stock loan market does not work well and does not attract enough interest. There are a few problems with his argument.

313. First, the centralized segment of Japanese stock loan market has a very different design from what we would expect to be implemented in the United States. For example, all supplies of the Japanese centralized markets come from JSFC (Japan Securities Finance Co., through margin accounts and custodian businesses), and the lending rate (fee) of the shares is standardized (fixed). Only when the demand for borrowing shares exceeds supply would there be a price discovery process via auctions to determine the market-based lending rate. It is highly unlikely that U.S. stock loan market would ever have fixed prices on exchanges—in the U.S., an important function of the exchange is to produce robust and competitive price discovery.

314. Second, the exchange and OTC segments of the Japanese stock loan market also differ in that the latter is outside the Japanese regulators' supervision. Huszar and Prado (2019) wrote in their Appendix 2: "On the other hand, the OTC facilitated stock borrowings are nontransparent, the Japanese regulators have little if any oversight of a stock borrowing contract

³¹⁶ Zsuzsa R. Huszar & Melissa P. Prado, *An Analysis of Over-the-Counter and Centralized Stock Lending Markets*, 43 J. Fin. Mkts. 31, 35 (2019).

of Toyota Shares between two U.S. funds.”³¹⁷ The OTC market, therefore, provides offshore investors a way to avoid regulation and supervision. This feature of onshore/offshore distinction is irrelevant for the U.S. stock loan market. As far as this litigation is concerned, we are only talking about domestic U.S. stock borrowers and lenders.

315. These two points imply that the reason that OTC market dominates in Japanese stock loan market has much to do with their specific design of fixed fees on the exchange segment and regulatory arbitrage afforded by the OTC (offshore) segment. Therefore, the evidence and quotes from Huszar and Prado (2019) that Prof. Hendershott relied on do not show that the exchange model would not work in the U.S. because the U.S. has no reason to implement fixed fees on exchanges and give OTC segment a regulatory benefit.

316. Like Japan, Singapore also has a parallel system with an exchange/onshore segment and an OTC/offshore segment. Launched in 2002, the exchange/onshore segment has fixed lending fees: borrowers pay 6% and lenders get 4%.³¹⁸ As I discussed above, there is no reason to expect the U.S. implementation of exchange trading to use a fixed-fee design.

317. The New Zealand stock loan market only has a centralized market, launched by NZX Clearing in 2010. The fees are tied to the Official Cash Rate, or OCR.³¹⁹ Borrowers pay “OCR plus, with a floor of 2%, plus 52 bps (per annum)” and lenders receive “OCR, with a floor of 2 %, minus 51 bps (per annum).”³²⁰

³¹⁷ *Id.* at 50.

³¹⁸ *Id.* at Appendix 1; Equilend et al., *Asia Pacific Securities Lending Market User Guide 2020* 75 (2020), <https://www.equilend.com/wp-content/uploads/2020/04/Asia-Pacific-Securities-Lending-Market-User-Guide-2020.pdf>.

³¹⁹ *Official Cash Rate (OCR) Decisions and Current Rate*, Reserve Bank of New Zealand, <https://www.rbnz.govt.nz/monetary-policy/official-cash-rate-decisions> (last visited Sept. 30, 2021).

³²⁰ See NZX Clearing, *NZX Clearing & Depository Participant Fee Schedule effective 1 May 2021* § 3.2.5. (2021), <https://www.nzx.com/services/market-participants/participant-fees>.

318. Summarizing, Japan, Singapore, and New Zealand all have an exchange model of stock lending, launched in 1977, 2002, and 2010, respectively. These CCP-based solutions support my point that central clearing of stock loans is viable. Their exchange trading mechanisms, however, are handicapped by fixed and inflexible fees. In Singapore and New Zealand, the lend-borrow spread are 200 bps and 103 bps. If anything, the relatively inactive exchange segment of these stock loan markets shows that wide bid-ask spreads hamper trading activity. I fully expect that a U.S. implementation of exchange model for stock loans would be driven by demand and supply, with flexible and competitive price discovery.

2. The United States Repo Market Supports My Opinions on Antitrust Impact

319. In paragraphs 179-184, Prof. Hendershott argues that U.S. repo market has little central clearing and anonymous trading, and concludes that U.S. stock loans should not, either. I disagree with Prof. Hendershott's assessment for two reasons. First, the segment with central clearing and multilateral trading is larger than what Prof. Hendershott acknowledges. Second, the Treasury market structure that Prof. Hendershott relies on is not sustainable; if anything, the U.S. repo market has been shifting steadily toward central clearing, anonymous trading, and transparency.

320. U.S. repo markets have two broad categories: triparty and bilateral. In each category, there is a centrally cleared segment and a non-cleared segment. In the triparty category, the general collateral financing ("GCF") repo segment is fully centrally cleared via FICC, a clearinghouse and subsidiary of DTCC. Baklanova, Copeland, and McCaughrin (2015) write: "GCF Repo trades are completed on an anonymous basis through interdealer brokers. FICC acts as a central counterparty in GCF Repo, interposing itself and serving as the legal counterparty to each side of the repo transaction for settlement purposes. FICC also provides a

netting service, allowing dealers to offset their repo and reverse repo positions for trades where the securities posted as collateral are of a similar type.”³²¹ According to the DTCC website, “Dealers execute GCF Repos through Repo Brokers, who are also members of FICC, **on an anonymous, or ‘blind,’ basis. FICC guarantees settlement** as soon as it receives the data from the broker and compares the transaction.”³²²

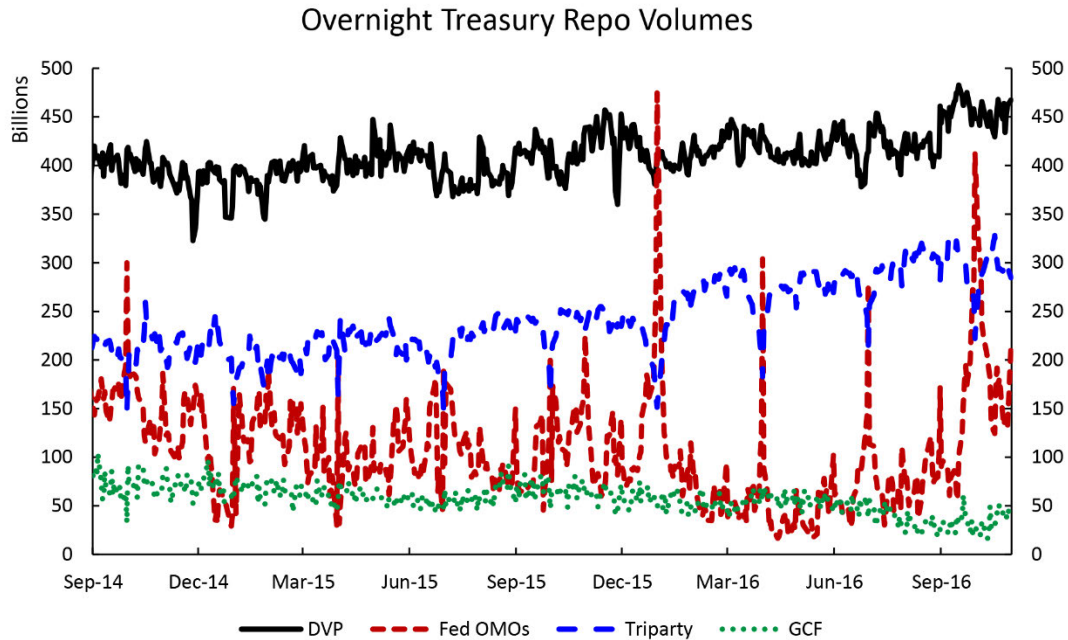
321. In the bilateral category, FICC’s DVP repo service is also centrally cleared. The non-centrally cleared bilateral repo market has been opaque and the official sector does not have a full view of the market.

322. A 2017 publication from the Federal Reserve (Bowman, Loria, McCormick, and Styczynski) reports the transaction volume in various segments of U.S. repo markets from September 2014 to September 2016.³²³ The centrally cleared segments, DVP (cleared bilateral repo) and GCF (cleared triparty repo), add up to about \$500 billion per day. This is not a small amount. This chart does not include non-cleared bilateral repos because details there elude even the official sector.

³²¹ Victoria Baklanova et al., *Reference Guide to U.S. Repo and Securities Lending Markets* 9 (2015), https://www.newyorkfed.org/medialibrary/media/research/staff_reports/sr740.pdf.

³²² See *GCF Repo*®, DTCC, <https://www.dtcc.com/clearing-services/ficc-gov/gcf-repo> (last visited Sept. 30, 2021) (emphasis added).

³²³ See David Bowman et al., *The Cleared Bilateral Repo Market and Proposed Repo Benchmark Rates* (Feb. 17, 2017) (unpublished manuscript) (on file with FEDS Notes), <https://www.federalreserve.gov/econresdata/notes/feds-notes/2017/cleared-bilateral-repo-market-and-proposed-repo-benchmark-rates-20170227.html>.

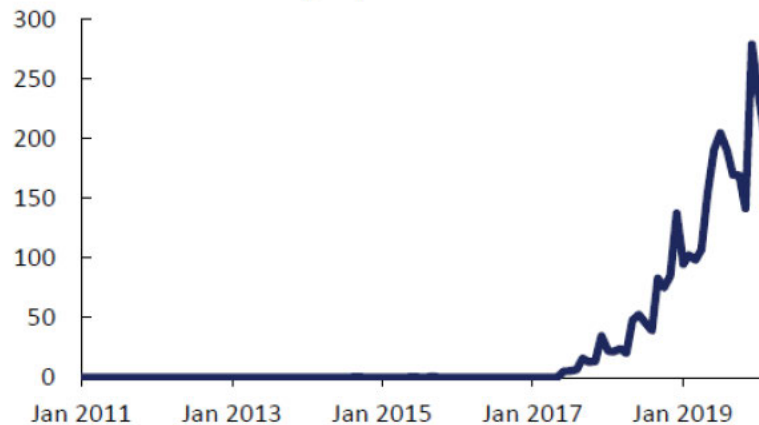


323. Prof. Hendershott emphasizes that these centrally cleared repo transactions are mostly interdealer. That may be the case historically, but recent trends reveal that end users embrace cleared repos whenever they are made available. The following chart, taking from a very recent study by the Office of Financial Research (Barth and Kahn 2021), shows the tremendous growth of lending by money market mutual funds in the centrally cleared segment of repo market, growing from zero in 2017 to over \$250 billion repo outstanding in two to three years:³²⁴

³²⁴ See Daniel Barth & R. Jay Kahn, Hedge Funds and the Treasury Cash-Futures Disconnect (April 1, 2021) (unpublished manuscript) (on file with Office Financial Research), <https://www.financialresearch.gov/working-papers/files/OFRwp-21-01-hedge-funds-and-the-treasury-cash-futures-disconnect.pdf>.

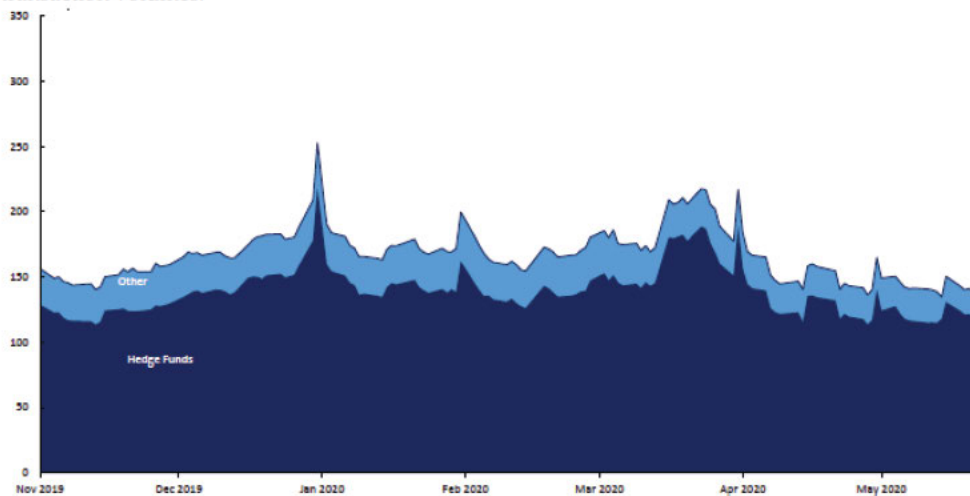
Highly Confidential

Figure 20: Money market fund repo with FICC (\$ billions). Aggregate repo volume outstanding. FICC stands for Fixed Income Clearing Corporation.



324. The following chart, taken from the same study, shows that participation by cash-borrowing customers in DVP repos (cleared bilateral repo) is about \$150 billion-\$200 billion from November 2019 to May 2020. Adding up the cash-lending side and cash-borrowing side, the centrally cleared repo market attracted \$400 billion-\$450 billion volume outstanding as of 2020. Again, it is not a small amount. Prof. Hendershott's footnote 373 misleadingly characterized the DVP volume of \$150 billion-200\$ billion as "interdealer", despite the authors' clear labeling that the vast majority of this cash borrowing (reverse repo) is done by hedge funds.

Figure 19: DVP sponsored reverse repo by participant type (\$ billions). Data are aggregate daily transaction volumes.



325. The recent growth of end-user participation in cleared U.S. repo market brings me to my next point: the old OTC-dominant U.S. Treasury market and repo market are widely recognized as in need of significant reform, and reform is ongoing. To elaborate the context, the severity of the market structure problem of the U.S. Treasury and repo markets played out evidently during three recent major events: the Flash Rally in October 2014; the repo crisis in September 2019; and the broad dysfunction of the Treasury market in March 2020.

326. On October 15, 2014, the benchmark 10-year U.S. Treasury note had a sharp spike in price before reversal. The resulting 37-bps range in the 10-year yield is much larger than the usual day-to-day fluctuation. When conducting an analysis of the event, regulators realized that even they did not have enough data about the transactions in the Treasury market. The October 2014 event revealed the systematic opacity of the U.S. Treasury market. As a result, FINRA started collecting Treasury transaction data in July 2017 via TRACE.

327. On September 17, 2019, the median Treasury repo rate reached 5%, and the 99th percentile of repo rates spiked to 9%.³²⁵ During that period, the typical repo rate is about 2%. The dramatic spike in repo rates revealed a bottleneck in the dealer-centric Treasury repo market. The Federal Reserve promptly opened an overnight repo operation, which can provide up to \$75 billion cash to the financial system. Importantly, the Fed's repo facility allows investors to borrow directly from the Fed by pledging collateral (Treasury, Agency, and Agency MBS securities), rather than transacting with dealers. The Fed's immediate action calmed down the repo market, and repo rate recovered to normal levels quickly.³²⁶

³²⁵ See Gara Afonso et al., *The Market Events of Mid-September 2019* 1 (2020) https://www.newyorkfed.org/medialibrary/media/research/staff_reports/sr918.pdf.

³²⁶ See *id.* at 23.

328. In March 2020, during the COVID-19 crisis, the U.S. Treasury market experienced widespread dysfunction. As described by a recent report by the G30 Working Group on Treasury Market Liquidity:³²⁷

“[T]he 10-year yield spiked 64 basis points between March 9 and 18. The 30-year bond lost 10 percent of its market value over March 16 and 17. Bid-offer spreads quoted by dealers for off-the-run Treasuries increased by over a factor of 10. In the interdealer market, the depth of quoted liquidity for on-the-run 10-year securities dropped from normal levels of about \$300 million to about \$25 million. The yields of similar-maturity Treasuries were no longer close to each other. Primary dealers reported Treasury settlement failures (trades that failed to settle on the contractual settlement date [typically the next business day after the trade]) at roughly triple their normal levels, totaling approximately \$1.5 trillion in fails over the three-week period beginning March 16... Financing for Treasuries suddenly became scarce. Treasury repo rates spiked in the interdealer market... In short, U.S. Treasuries did not serve their traditional safe-haven role. Instead, dysfunction in the Treasury market exacerbated the crisis.”

329. Just like in the September 2019 event, the Federal Reserve had to step in to provide essentially unlimited liquidity to dealers in the repo market to quell the extreme market stress.

330. These three major events, which materialized in a span of a few years, indicate that the Treasury market and the Treasury repo market are in urgent need of reform. Indeed, the collection of Treasury transaction data by FINRA and the wider use of sponsored repo are significant steps of reform. Additionally, the recent report by the G30 Working Group on Treasury Market Liquidity made several recommendations to further reform the U.S. Treasury repo market:³²⁸

Recommendation 1: The Federal Reserve should create a Standing Repo Facility (SRF) that provides very broad access to repo financing for U.S. Treasury securities on terms that discourage use of the facility in normal market conditions without

³²⁷ See Group of Thirty Working Group on Treasury Market Liquidity, *U.S. Treasury Markets Steps Toward Increased Resilience* 3 (2021), https://group30.org/images/uploads/publications/G30_U.S._Treasury_Markets-_Steps_Toward_Increased_Resilience__1.pdf.

³²⁸ See *id.* at 8.

stigmatizing its use under stress. It should make permanent its Foreign and International Monetary Authority repo facility.”

Recommendation 2: All trades of Treasury securities and Treasury repos executed on electronic interdealer trading platforms that offer anonymous trading by interposing an interdealer broker between buyers and sellers should be centrally cleared.

Recommendation 3: Treasury repos should be centrally cleared

Recommendation 8: FINRA’s TRACE reporting system should be expanded to capture all transactions in U.S. Treasury securities and Treasury repos, including those of commercial bank dealers and PTFs. Furthermore, subject to a cap on the disclosed size of trades, the data should be publicly disclosed in a manner similar to the way that data on corporate bond transactions are currently disclosed.

331. The G30 Working Group is chaired by Tim Geithner, former U.S. Secretary of the Treasury, and members include William Dudley, the former president of the Federal Reserve Bank of New York, Mervin King, the former governor of the Bank of England, and Lawrence Summers, former U.S. Secretary of the Treasury, among others. Their recommendations strongly indicate that the old Treasury repo market structure dominated by OTC trading—which is emphasized by Prof. Hendershott—is, in fact, unsustainable; instead, much wider use of central clearing and post-trade transparency are required and are already underway.

3. *My Yardstick Markets Are Comparable*

332. In paragraphs 187-191, Prof. Hendershott argues that the yardstick markets that I used—including U.S. stock markets, corporate bond markets, government bond markets, and oil futures market—are not comparable to stock lending markets. He cites nonstandard contracts, infrequent trading with large sizes, and “information leakage” as reasons why stock loan markets are not suited for platform trading. I disagree. Contract specification and trading frequency are endogenous outcomes of market structure, and information leakage can be avoided if traders wish to hide their intentions.

333. I would like to reiterate the economic rationale in my original report, that is, the U.S. stock market is the closest to U.S. stock loan market because they are tied by several strong economic linkages:

- Short selling in the stock market requires borrowing shares in the stock loan market.
- Stock loans and stock sales both lead to the transfer of ownership, although the transfer is temporary for stock loans and permanent for stock sales. If a shareholder wishes to vote on a corporate decision, buying the shares and borrowing the shares are substitutes.
- The total return of owning a stock includes lending fees, especially for hard-to-borrow stocks.

334. The relation between the stock market and the stock loan market is analogous to the market for home sales and home rentals. Real estate websites such as Zillow match supply and demand for both home sales and rentals. Home sales are highly standardized: the ownership transfers from the seller to the buyer permanently, and real estate attorneys have standardized contracts and forms. But there are many variants of home rentals, depending on the term of the rental, how much deposit is required, which parties pay which utility bills, etc. According to Prof. Hendershott, because of differences in contract, the home rental market is entirely separate from the home sales market. This separation is artificial. People who look for a place to live generally consider renting and buying (with financing) as alternatives. Homeowners who have an extra home generally consider selling it and renting it out as alternatives. Some investors buy or build properties for the very purpose of renting them out.

335. Schooling is another example. A family who lives in a particular zip code is generally assigned to a unique public-school district, and attending the public school is a highly standardized process of registering and filling standard forms. On the other hand, families often have many private schools to choose from, and every school has a different application process and a (slightly) different set of values they emphasize. Despite the nonstandardization of private schools, parents almost surely compare public schools with private school options when deciding

where to send their kids. Teachers and school administrators, too, consider public schools and private schools as alternative employers.

336. The bottom line is that contract standardization does not take away the economic similarity between the stock market and the stock loan market, especially because Prof. Hendershott himself admits that stock loan contracts *are* standardized as well.³²⁹

337. In paragraphs 192-196, Prof. Hendershott argues that the U.S. corporate bond market, U.S. Treasury market, oil futures market, and U.S. stock markets have some differences from the U.S. stock loan market and therefore cannot serve as suitable benchmarks. But the differences cited by Prof. Hendershott are not important to my analysis.

338. First, to clarify, my impact opinions do not rely on comparing an OTC-only world to a platform-only world—the key question is whether all Class members are better off with the *option* of multilateral trading. As mentioned above, when viewed through this lens, Prof. Hendershott’s own empirical work is compelling evidence of my theory of impact. Specifically, Prof. Hendershott’s own paper shows that the multilateral trading option of MarketAxess helps investors reduce transaction costs.³³⁰ If investors always received worse prices on multilateral platforms than OTC, they would not use the platform, but they do.

339. Prof. Hendershott also notes that a reduction of bid-ask spread for on-the-run U.S. Treasury securities in the interdealer market does not mean low transaction costs in the dealer-to-customer segment or off-the-run Treasuries. But a higher liquidity and lower trading costs of on-the-runs almost surely reduces the dealers’ costs for hedging exposures in off-the-run securities.

³²⁹ Hendershott Rpt. ¶ 150 n.293 (quoting Amended Complaint ¶ 109).

³³⁰ Hendershott & Madhavan, *Click or Call*, *supra* note 1, at 428.

340. Finally, Prof. Hendershott notes that the oil futures market and U.S. stock markets already have multilateral and the academic papers cited are about rule changes within the multilateral trading world, not a shift from an OTC structure to a multilateral platform. But the fact that U.S. stock market and futures market have been multilateral over the past several decades highlights that the U.S. stock loan market structure is severely lagging similar markets.

341. More broadly, exogenous natural experiments in financial markets are rare. It is a standard and productive practice for economists to look at evidence in various settings and synthesize the economic forces at play in order to inform potential impact of new policies in new markets. The evidence I cited in U.S. corporate bond market, U.S. Treasury market, oil futures market, and U.S. stock market all shows that competition works: adding a multilateral trading platform as an outside option reduces transaction costs; a shift from manual to electronic trading substantially reduces transaction costs; a shift from open outcry to electronic trading substantially reduces transaction costs; and allowing investors to trade with each other substantially reduces transaction costs. Simple economic forces are more generally applicable than what Prof. Hendershott recognizes.

342. In paragraphs 197-199, Prof. Hendershott proposes other yardstick markets, including “those in which substantial platform or exchange-based trading has never developed, those in which entities have tried and failed to establish platforms or exchanges, and those in which OTC venues and platforms exist side-by-side.”³³¹ He cites Weill (2020)’s statement that “[e]ven for assets that mostly trade in centralized markets, OTC markets may attract an economically significant fraction of volume.”³³²

³³¹ Hendershott Rpt. ¶ 197.

³³² *Id.* ¶ 198 (citing Pierre-Olivier Weill, *The Search Theory of OTC Markets*, 12 Annual Rev. Econ. 247, 248 (2020)).

343. As mentioned, I have never argued that platform trading would replace OTC trading entirely. My opinion is that the addition of multilateral trading benefits all investors. In my initial report, I explicitly recognized the possibility that some investors may stay OTC. So, in this regard, the quote from Weill (2020) does not conflict my own opinion.

344. Prof. Hendershott cites my own paper on the index CDS market.³³³ After Dodd-Frank Act of 2010, standardized and liquid OTC derivatives must be traded on swap execution facilities (SEFs). On the two dominant trading venues we studied (Bloomberg and Tradeweb), investors receive frequently updated streaming quotes from dealers throughout the day. Then, based on the streaming quotes, investors decide between (i) use the limit order book, (ii) send a request for quotes to a few dealers, or (iii) respond to a particular dealer's quote.

345. In the data, the limit order book mechanism is rarely used. But Prof. Hendershott omits an important detail: the limit order books have name give-ups, that is, the identities of customers who trade on the order book are disclosed to the counterparty after the trade. Buyside investors have long argued that name give-ups are unnecessary for standardized derivatives as those contracts are centrally cleared and there is no need to reveal the identities of counterparties.³³⁴ We discussed name give-ups extensively in the paper, but Prof. Hendershott

³³³ See Lynn Riggs, Esen Onur, David Reiffen, & Haoxiang Zhu, *Swap Trading After Dodd-Frank: Evidence from Index CDS*, 137 J. Fin. Econ. 857, 861 (2020) ("However, we do not find evidence that clearing relationships or past trading relationships have a significant impact on transaction costs.").

³³⁴ See, e.g., Managed Funds Association, *MFA Position Paper: Why Eliminating Post-Trade Name Disclosure Will Improve the Swaps Market* 1 (2015), <https://www.managedfunds.org/wp-content/uploads/2015/04/MFA-Position-Paper-on-Post-Trade-Name-Disclosure-Final.pdf>.

omits to mention this important issue. After seeking market feedback, in July 2020, the CFTC formally prohibited name give-ups on swap execution facilities.³³⁵

346. Excluding limit order books, customers seeking liquidity choose requests for quotes about 36% of the times and choose responding to the quote of a single dealer (effectively, RFQ to one dealer) about 64% of the times. But as mentioned, the choice of trading mechanism is already conditional on streaming quotes, i.e., some degree of pre-trade transparency. It is misleading to omit this important context. The conclusion from the index CDS papers is quite the opposite from Prof. Hendershott's interpretation.

347. Finally, Prof. Hendershott cites two papers about the foreign exchange market: Holden, Lu, Lugovskyy, and Puzzello (2021), and Bollen and Rasiel (2003). He also cited de Roure, Moench, Pelizzon, and Schneider (2020) about the German sovereign bond market. He alluded to the possibility of using these markets as yardsticks.³³⁶

348. The two papers about foreign exchange have material structural differences from the U.S. stock loan market. Holden, Lu, Lugovskyy, and Puzzello (2021) look at the impact of the addition of an OTC component in the Chinese USD/CNY spot foreign exchange market from 2005 to 2006. The authors explicitly recognize that "there are multiple pieces of evidence that the credit risk in China's spot FX market is minimal, and so its influence on traders' choice on

³³⁵ See Post-Trade Name Give-Up on Swap Execution Facilities, 85 Fed. Reg. 44693 (Jul. 24, 2020) (to be codified at 17 C.F.R. pt. 37), <https://www.govinfo.gov/content/pkg/FR-2020-07-24/pdf/2020-14343.pdf>.

³³⁶ Hendershott Rpt. ¶ 200 (citing Craig W. Holden et al., *What Is the Impact of Introducing a Parallel OTC Market? Theory and Evidence from the Chinese Interbank FX Market*, 140 J. Fin. Econ. 270, 276 (2021); Nicolas P.B. Bollen & Emma Rasiel, *The Performance of Alternative Valuation Models in the OTC Currency Options Market*, 22 J. Int'l Money & Fin. 33, 36 (2020); Calebe de Roure et al., *OTC Discount*, SAFE Working Paper No. 298 (Dec. 7, 2020)).

the two different trading venues is negligible.”³³⁷ After all, the largest Chinese banks are state-owned, and their solvency is essentially guaranteed by the Chinese government. In the United States, counterparty risk is a material concern, in particular after the 2008-09 crisis. Basel III capital regulations also favored central clearing, which is missing in the period studied by Holden et al. Likewise, Bollen and Rasiel’s paper is about options pricing and uses data from 1997 to 1999, way before the mounting counterparty risk concern during and after the financial crisis of 2008-09.³³⁸

349. If anything, the paper about German government bonds actually supports my conclusion, not Prof. Hendershott’s. German government bonds are traded both on exchanges and OTC. That setting is like the but-for world of the stock loan market. de Roure et al. compare the prices in the two segments from 2011 to 2017 and find that OTC transactions happen most of the time between the exchange bid and the exchange ask.³³⁹ This evidence is consistent with the price discipline effect of exchange prices on OTC prices. Moreover, for the purpose of this case, the comparison between exchange prices and OTC prices in the but-for world, which Prof. Hendershott seems to take as evidence supporting his point, is not the proper comparison; instead, the proper comparison is between the prices obtained by customers in the actual world vs the but-for world. In the German context, it is about comparing prices with the exchange option vs without it, and the cited paper is silent on this point.

³³⁷ Craig W. Holden et al., *What is the Impact of Introducing a Parallel OTC Market? Theory and Evidence from the Chinese Interbank FX Market*, 140 J. Fin. Econ. 270 (2021) at 274.

³³⁸ Nicolas P.B. Bollen & Emma Rasiel, *The Performance of Alternative Valuation Models in the OTC Currency Options Market*, 22 J. Int’l Money & Fin. 33, 36 (2020) at 36.

³³⁹ de Roure et al., *OTC Discount 1* (Leibniz Inst. for Fin. Research, Working Paper No. 298, 2020).

4. *The Presence of Non-Anonymous Multilateral Trading in My Yardstick Markets Supports My Opinions of Antitrust Impact*

350. In paragraphs 201-210, Prof. Hendershott argues that anonymous platform trading is not identical to electronic trading or central clearing. He cites a few examples in which trading is electronic but not anonymous, or in which central clearing is present but trading is OTC. The thrust of his argument is that non-anonymous electronic trading in other markets does not provide reliable economic support for the possibility of anonymous electronic trading in the stock lending market. I disagree, as non-anonymous multilateral trading is often an interim step before anonymous multilateral trading.

351. First, as I discussed in my initial report, moving bilateral trading to a computer screen does not quality it as multilateral trading because there is no contemporaneous price competition. Prof. Hendershott cites my own research on index CDS market. But as I elaborated above, my paper did make it clear that the “bilateral” part of index CDS trading is already conditional on frequently updated dealer quotes throughout the day, that is, customers already have received competing price quotes before deciding where to trade. That protocol is starkly different from the current practice in stock loan market in which end users do not receive competing quotes from multiple dealers simultaneously. And as I also mentioned above, a main reason behind the low usage of limit order books in index CDS market in the sample we studied (May 2016) is name give-up, that is, end users’ identities are revealed needlessly after the trade. Name give-up was prohibited by the CFTC in 2020.

352. The mechanisms used in index CDS markets are already non-anonymous multilateral trading (limit order books reveal customer identities ex post, whereas RFQs and responding to streaming quotes reveal customer identities ex ante). The next step would be anonymous multilateral trading. In a recent publication, Meling (2021) finds that anonymity

dramatically reduces bid-ask spreads by 40% and increases trading volume by more than 50% in the Oslo Stock Exchange (OSE).³⁴⁰ In June 2008, the OSE introduced post-trade anonymity for the 25 most traded stocks, i.e., the buyer broker ID and seller broker ID are masked. But trade reporting for the rest of the stocks still reveals the identities of the buyer broker and the seller broker. The list of 25 stocks is updated every six months. To make sure that the selection based on liquidity in the prior six months does not influence the result, Meling uses the standard method of “regression discontinuity” in the economics literature, i.e., compare stocks that just make the top 25 list versus stocks that just miss the top 25 list. The rationale is that there is some randomness in whether stocks near the 25th liquidity ranking fall on one side or the other side of the cutoff, so the comparison between stocks just in the list and stocks just outside it identifies the impact of treatment, in this case post-trade anonymity. A spread reduction of 40% is a huge effect, and it is strong evidence that adding anonymity on top of multilateral trading brings a large benefit to all investors (as they all have access to public quotes).

353. Prof. Hendershott also mentions that most corporate bond trades in today’s markets are OTC, but he also acknowledges that electronic trading has increased. In a data sample from 2010 to 2011, Hendershott and Madhavan (2015) find that multilateral requests for quotes have become a mainstream trading protocol, accounting for about 10% of all corporate bond transactions.³⁴¹ Subsequent studies further reveal that quoting and trading activities on corporate bond platforms are more active than believed. For example, a Securities and Exchange Commission study, Craig, Kim, and Woo (2020), find active dealer quotes of public corporate

³⁴⁰ Tom Meling, *Anonymous Equity Trading*, 76 J. Fin. 707, 709 (2021).

³⁴¹ Hendershott & Madhavan, *Click or Call*, *supra* note 1, at 423.

bonds and 144A bonds.³⁴² They obtain detailed message-level data from two alternative trading systems (ATSs) that support corporate bonds, KCG and TMC, from August 1, 2014, to November 28, 2014 (82 business days). The following table, taken from the study, shows 9.36 million quotes on 16,717 corporate bonds over 82 days, where multiple dealer-CUSIP quotes on the same day are treated as one. That is, on average, 6.8 dealers provide at least one live quote (bid or offer or both) on a public corporate bond per day. These quotes are available to all ATS subscribers.

Table 1. Number of live dealer quotes and corporate bond issues quoted

Table 1 presents the number of live dealer quotes and the number of TRACE-eligible corporate bond issues (CUSIPs) quoted on corporate bond ATSs for the duration of our sample period: from August 1, 2014 to November 28, 2014 (82 business days) broken out by public and Rule 144A bonds. We identify dealers who provide live quotes on ATSs using MPIDs. In counting the number of live dealer quotes on ATSs, we count the number of unique CUSIP-MPID pairs on a given day.

	Number of Quotes (in thousands)	Number of TRACE-eligible bond issues (CUSIPs)
Quote (bid or offer)		
Public bonds	9,356	16,717
Rule 144A bonds	105	1,453
Bid		
Public bonds	6,129	16,461
Rule 144A bonds	27	809
Offer		
Public bonds	3,227	13,740
Rule 144A bonds	78	1,347

Source: DERA analysis

354. Table 2 of the same study, pasted below, shows that on average, 53.9% of TRACE-eligible public corporate bonds have bid quotes on a given day, 35.7% have offer

³⁴² See Louis Craig et al., *Pre-trade Information in the Corporate Bond Market* (2020), https://www.sec.gov/files/corporate_bond_white_paper.pdf. 144A bonds are corporate bonds that are directly placed to qualified institutional investors without the public registration process.

quotes, and 35% have both.

Table 2. Corporate bond issues quoted per day and the number of dealer quotes per day

Panel A reports the daily distribution for the number of TRACE-eligible corporate bonds and the percentage of TRACE-eligible bonds quoted. Panel B presents the distribution for the number of bond issues quoted and live dealer quotes per day. Panel C reports the number of days quoted per bond issue (CUSIP) conditional on a bond having at least one quote during the sample period: from August 1, 2014 and November 28, 2014 (82 business days). Panel D presents the distribution of quote duration in hours per bond issue and quote size conditional on a bond having at least one quote on a given day.

Panel A: Number of TRACE-eligible corporate bonds and percentage of bonds quoted per day

		Distribution							
		Mean	5th percentile	10th percentile	25th percentile	Median	75th percentile	90th percentile	95th percentile
Number of TRACE-eligible bonds (CUSIPs)	Public bonds	28,066	27,781	27,794	27,848	28,069	28,244	28,350	28,381
	Rule 144A bonds	5,007	4,971	4,973	4,980	5,009	5,032	5,049	5,054
TRACE-eligible bonds with bid	Public bonds	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
	Rule 144A bonds	53.9	53.1	53.2	53.6	54.1	54.5	54.6	54.6
TRACE-eligible bonds with offer	Public bonds	5.4	4.1	4.2	4.9	5.5	6.0	6.8	7.1
	Rule 144A bonds	35.7	35.2	35.3	35.5	35.8	36.1	36.4	36.4
TRACE-eligible bonds with both bid & offer	Public bonds	14.8	13.8	14.1	14.3	14.8	15.4	15.8	16.0
	Rule 144A bonds	35.0	34.5	34.6	34.9	35.1	35.4	35.7	35.7
TRACE-eligible bonds with both bid & offer	Public bonds	3.0	2.0	2.3	2.6	2.9	3.4	4.1	4.4
	Rule 144A bonds								

Source: DERA analysis

355. The study provides additional statistics. But the main theme is that as of 2014, a sample of just two ATS already provide decently pre-trade information on most corporate bonds.

356. Prof. Hendershott's own recent research also shows that all-to-all trading is gaining traction in the corporate bond market. In 2012, MarketAxess introduced the "open trading" protocol, which is effectively an anonymous RFQ-to-all. All users of the platform, including end users, can act as liquidity seekers or liquidity providers (by responding to others' requests). When users send a conventional RFQ, the user has the option to tick an open-trading box so that the message is sent to everyone on the platform.

357. Using data from MarketAxess from January 2014 to December 2018, Hendershott, Livdan, and Schurhoff (2021) find that open trading grew to about 12% of MarketAxess trades in 2018, as shown in their Figure 2, reproduced below.³⁴³ Moreover, they find that 91% of trades and 88.1% of volume on MarketAxess have open-trading enabled, that is, liquidity seekers have a strong preference to use all-to-all trading.

³⁴³ See Hendershott et al., *Do We Need Dealers?*, *supra* note 28, at 7.

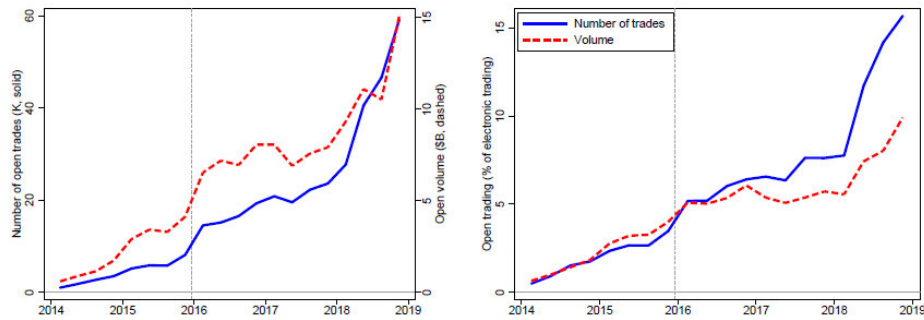
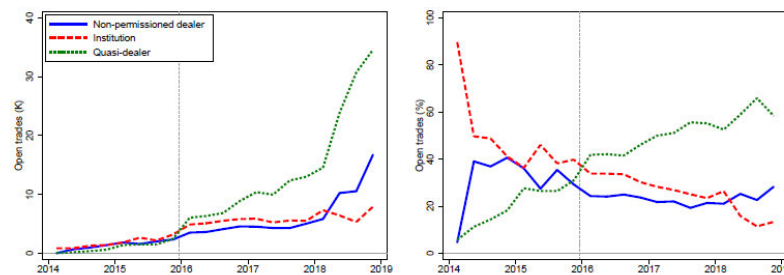


Figure 2: Open trading on MarketAxess

The left plot presents the quarterly open trades that are executed on MarketAxess, both in terms of number of trades (solid) and total par amount traded (dash). The right plot presents the quarterly average open trades that are executed on MarketAxess as a share of electronic trading, both in terms of number of trades (solid) and total par amount traded (dash). The vertical dotted line marks the increase in OT at the end of 2015.

358. Hendershott et al also show that all-to-all trading enable customers to connect to counterparties that they were not interacting with in conventional voice trading or non-anonymous RFQs. On MarketAxess, non-anonymous trades are treated as bilateral, i.e., the buyer and the seller face each other directly in trade clearing and settlement. In the all-to-all protocol of open trading, MarketAxess becomes the trade counterparty to both the buyer and the seller. This enables all platform users to trade with everyone else. Indeed, as Figure 3 of this study (reproduced below) shows, a new entrant liquidity provider (labeled “quasi-dealer”) handles about 60% of all-to-all trades and 40% of all-to-all volume as of 2018. This entrant later registered with the SEC to become a broker-dealer. Moreover, as of 2018, about 30% of all-to-all trades and volume are between customers and “non-permissioned dealers,” i.e., conventional dealers with whom the customer has no outstanding credit relationship. Finally, institutionally investors, which act as liquidity seekers in the conventional OTC market, become liquidity providers and account for about 10% of trades and about 30% of volume in 2018. All this provides strong evidence that the all-to-all trading protocol in corporate bond market enabled trades that were impossible under the old OTC regime.

Panel A. Open trades split by type of liquidity provider



Panel B. Open volume split by type of liquidity provider

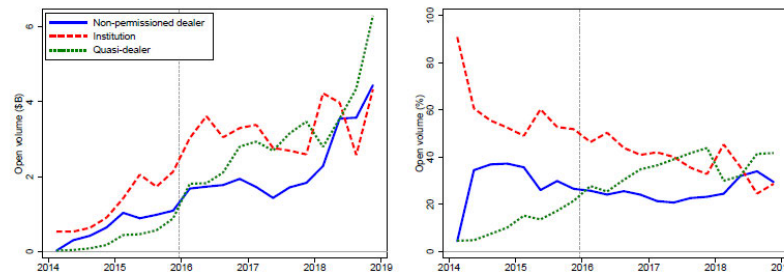


Figure 3: Non-permissioned dealers and non-dealer liquidity providers in OT

Panel A presents the number of trades and Panel B presents the total par amount traded (dash). The left plots present the quarterly open trades that are executed on MarketAxess, split by liquidity provider type into non-permissioned dealer, buy-side institution, and quasi-dealer. The right plots present the shares of OT by each liquidity provider. The vertical dotted line marks the increase in OT at the end of 2015.

359. As a result of higher degree of competition, all-to-all trading provides substantial price improvement to investors, as Figure 4 of the study shows (and reproduced below). Price improvement is measured as the price difference between the actual winning bid and the best non-open-trading bid price, normalized by the best non-open-trading bid price. For example, suppose the customer wishes to sell a bond. On a customer sell order, if the best non-anonymous RFQ bid is 100, and the best bid from open trading protocol is 100.2, then the price improvement is $(100.2-100)/100=20$ bps. From 2014 to 2018, price improvement brought by open trading ranges from 10 bps to 30 bps, and the savings are particularly salient for smaller issues, longer-maturity bonds, and lower credit quality bonds.

Highly Confidential

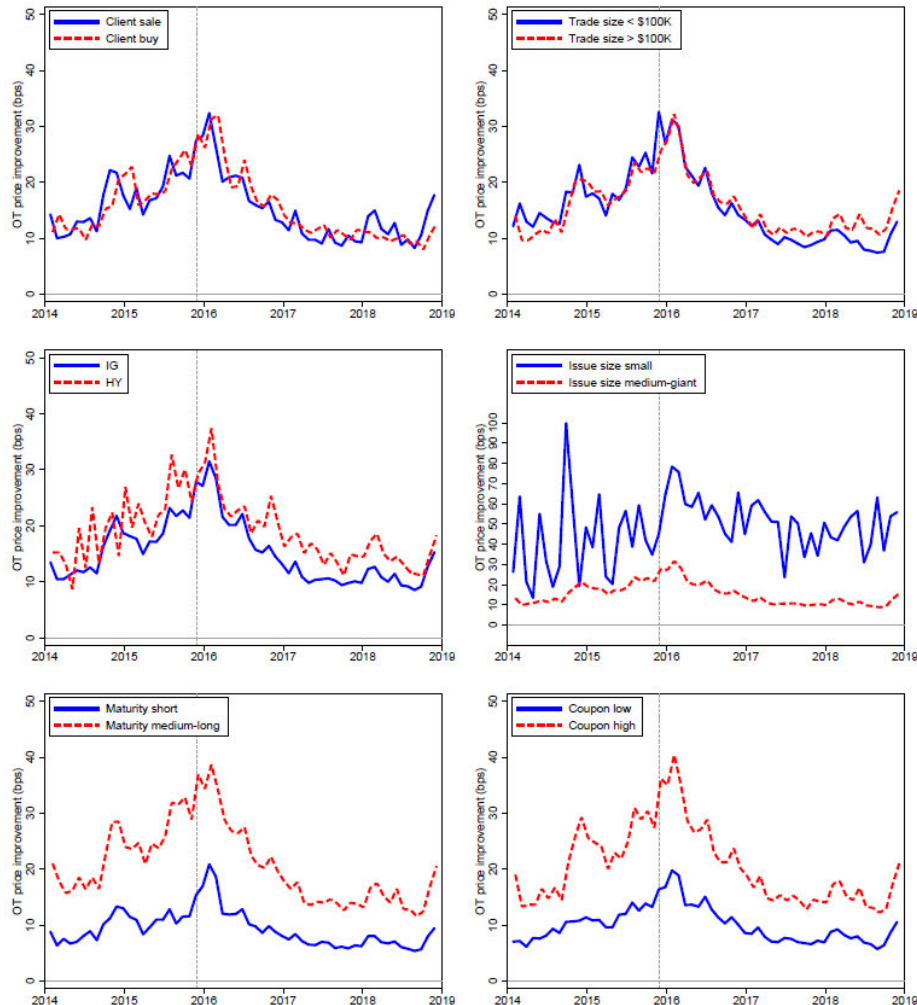


Figure 4: OT price improvement over time

The figures document OT price improvement over time. OT price improvement in RFQs is computed using expressions (2) and (3). The subplots report monthly averages for the splits indicated in the legend. The vertical dotted line marks the increase in OT at the end of 2015.

360. MarketAxess' 2020 annual report highlights the current state of multilateral trading in corporate bonds. In 2020, MarketAxess accounts for 21.6% of high-grade TRACE trading volume and 14.6% of high-yield TRACE trading volume. In addition, "[i]n 2020, 32.7% of all credit volume on the MarketAxess platform was executed via Open Trading protocols, up from 26.3% in 2019." The company "estimate[s] that liquidity takers saved an estimated \$673.7

million in transaction costs through Open Trading during 2020, while liquidity providers saved an estimated \$398.8 million during the year.”³⁴⁴

361. To summarize this point, while Prof. Hendershott talked down anonymous multilateral trading in CDS and corporate bond markets, the empirical evidence and regulatory initiatives clearly point to the opposite: multilateral trading is already a significant fraction of credit trading and keeps growing, and the anonymous portion is gaining traction fast.

362. The final few paragraphs of this section of Prof. Hendershott’s report argue that transactions in a market can stay OTC while they are centrally cleared. He cited practices in OTC derivatives and Brazilian stock loan market as examples. The question is not whether OTC trades will still exist (they will), it is whether multilateral platform trades constitute a nontrivial fraction of the overall market activity. For the latter, central clearing is needed. And once central clearing is available, anonymous multilateral trades become possible.

363. Prof. Hendershott argues that single stock futures are not comparable to stock loans because one has a fixed maturity while the other has a variable maturity. His argument is analogous to arguing buying monthly train passes is incomparable at all to buying an annual train pass. As I elaborated in my opening report, the economics of an open stock loan is essentially a one-day stock loan contract that is extendable upon mutual agreement. The maturity difference does not take away the substantive economic similarities between stock loans (the second leg) and single stock futures. As discussed above, maturities of stock loan contracts are consequences of market structure, and new contracts can be introduced if there is sufficient demand.

³⁴⁴ See MarketAxess, *Proxy Statement and Notice of Annual Meeting of Stockholders* 3-6 (2021), <https://investor.marketaxess.com/static-files/c4e3368b-80a6-4744-bf84-f8258154a067>.

Highly Confidential

364. His final examples in this section about centrally cleared interdealer markets in stock loans and repos actually support my point that the technology for central clearing has been ready for a long time. It is time that the same option is given to customers.

VI. CONCLUSION

365. In my opening report, I concluded that by January 1, 2012 at the latest, in the absence of the conspiracy, there would have been a sufficient scale of anonymous multilateral trading, including but not limited to trading on the AQS platform, to benefit all or virtually all Class members. Class members would have received better pricing, with borrowers paying less and lenders receiving more, both on platform trades and on OTC trades.

366. Defendants' experts lodged several critiques of my approach. I analyze and address all of their critiques throughout this reply report, and ultimately conclude their arguments do not alter my opinions.



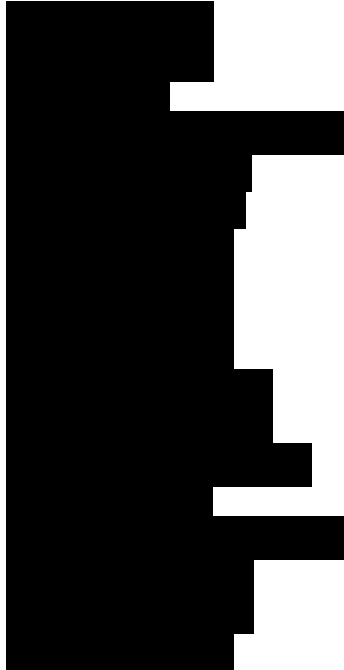
Professor Haoxiang Zhu

10/5/2021

Date

APPENDIX A: Reliance Materials

DOCUMENTS PRODUCED IN DISCOVERY



REPORTS

Expert Reply Report of Paul Asquith and Parag Pathak, October 5, 2021
Expert Report of Haoxiang Zhu, February 22, 2021
Expert Report of Justin McCrary, June 29, 2021
Expert Report of Paul Asquith and Parag Pathak, February 22, 2021
Expert Report of Terrence Hendershott, June 29, 2021

TESTIMONY

Declaration of [REDACTED] ([REDACTED]), October 4, 2021
Declaration of [REDACTED] ([REDACTED]), June 29, 2021
Declaration of [REDACTED] ([REDACTED]), June 29, 2021
Deposition of Dwight Nishimura (Torus), October 8, 2020
Deposition of Fabio Savoldelli, August 27, 2021
Deposition of [REDACTED] ([REDACTED]), September 15-16, 2020
Deposition of Haoxiang Zhu, May 11, 2021
Deposition of Justin McCrary, September 3, 2021
Deposition of [REDACTED] ([REDACTED]), March 3, 2020
Deposition of Nicolas Simeone (Torus), July 28, 2020
Deposition of Paul Riggio (Torus), August 18, 2020
Deposition of Terrence Hendershott, August 27, 2021

DEPOSITION EXHIBITS

Exhibit 1011 [REDACTED]
Exhibit 4002 [REDACTED]
Exhibit 5703 Terrence Hendershott

ARTICLES

Anat R. Admati et al., Fallacies, Irrelevant Facts, and Myths in the Discussion of Capital Regulation: Why Bank Equity is Not Socially Expensive (Rock Center for Corp. Governance at Stanford University, Working Paper No. 161; Stanford University Graduate School of Business Research Paper No. 13-7, 2013)

Calebe de Roure et al., OTC Discount 1 (Leibniz Inst. for Fin. Research, Working Paper No. 298, 2020)

Craig W. Holden et al., What is the Impact of Introducing a Parallel OTC Market? Theory and Evidence from the Chinese Interbank FX Market, 140 J. Fin. Econ. 270 (2021)

Daniel Barth & R. Jay Kahn, Hedge Funds and the Treasury Cash-Futures Disconnect (April 1, 2021)

Darrell Duffie, Piotr Dworczak, & Haoxiang Zhu, Benchmarks in Search Markets, 72 J. Fin. 1983 (2017)

David Bowman et al., The Cleared Bilateral Repo Market and Proposed Repo Benchmark Rates (Feb. 17, 2017)

George Stigler, The Economics of Information, 69 J. Pol. Econ. 213, 214 (1961)

Haoxiang Zhu, Finding a Good Price in Opaque Over-the-Counter Markets, 25 Rev. Fin. Stud. 1255, 1257-58 (2012)

Hau, Hoffmann, Langfield, and Timmer, 2020, "Discriminatory Pricing of Over-the-Counter Derivatives," Management Science (forthcoming)

James J. Angel et al., Equity Trading in the 21st Century: An Update 7, 15 (2013)

James R. Hedges IV, Hedge Fund Transparency, 11 Eur. J. Fin. 411, 413 (2005)

John Nash, Two-Person Cooperative Games, 21 Econometrica 128 (1953)

Larry Harris, Trading and Exchanges: Market Microstructure for Practitioners 533 (Oxford University Press 2003)

Linquan Chen, Essays on the Role of Short Selling in Financial Markets (Feb. 2016), Doctoral Thesis, University of Warwick

Liyan Yang & Haoxiang Zhu, Back-Running: Seeking and Hiding Fundamental Information in Order Flows, 33 Rev. Fin. Stud. 1484, 1486 (2020)

Louis Craig et al., Pre-trade Information in the Corporate Bond Market (2020)

Lynn Riggs, Esen Onur, David Reiffen, & Haoxiang Zhu, Swap Trading After Dodd-Frank: Evidence from Index CDS, 137 J. Fin. Econ. 857, 861 (2020)

Managed Funds Association, MFA Position Paper: Why Eliminating Post-Trade Name Disclosure Will Improve the Swaps Market 1 (2015)

Michael J. Barclay & Terrence Hendershott, Liquidity Externalities and Adverse Selection: Evidence from Trading After Hours, 59 J. Fin. 681 (2004)

Nicolas P.B. Bollen & Emma Rasiel, The Performance of Alternative Valuation Models in the OTC Currency Options Market, 22 J. Int'l Money & Fin. 33, 36 (2020)

Paul Pfleiderer, On the Relevancy of Modigliani and Miller to Banking: A Parable and Some Observations (Rock Center for Corp. Governance at Stanford University, Working Paper No. 93, 2010)

Peter Bassler & Ed Oliver, Securities Lending Best Practices: A Guidance Paper for Institutional Investors 10 (2015)

Skander J. Van den Heuvel., The Welfare Cost Of Bank Capital Requirements, 55 J. of Monetary Econ. 298, 299 (2008)

Terrence Hendershott & Charles M. Jones, Island Goes Dark: Transparency, Fragmentation, and Regulation, 18 Rev. Fin. Stud. 743 (2005)

Terrence Hendershott and Ananth Madhavan, 2015, "Click or Call? Auction versus Search in the Over-the-Counter Market," Journal of Finance, Volume 70, Number 1, Pages 419-447

Terrence Hendershott et al., Do We Need Dealers in OTC Markets? (2021)

The Alternative Reference Rates Committee, Progress Report: The Transition from U.S. Dollar LIBOR, tbl. 1 (2021)

Tom Meling, Anonymous Equity Trading, 76 J. Fin. 707, 709 (2021)

Ulrich Laitenberger & Florian Smuda, Estimating Consumer Damages in Cartel Cases, 11 J. of Competition Law & Econ. 955, 956-957 (2015)

Victoria Baklanova et al., Reference Guide to U.S. Repo and Securities Lending Markets 9 (2015)

Yakov Amihud et al., The Value of Trading Consolidation: Evidence from the Exercise of Warrants, 38 J. Fin. & Quantitative Analysis 829 (2003)

Zsuzsa R. Huszar & Melissa P. Prado, An Analysis of Over-the-Counter and Centralized Stock Lending Markets, 43 J. Fin. Mkts. 31, 35 (2019)

OTHER

12 C.F.R. § 217.100
<https://www.law.cornell.edu/cfr/text/12/217.100>

12 C.F.R. § 217.35
<https://www.law.cornell.edu/cfr/text/12/217.35>.

12 CFR § 217.37
<https://www.law.cornell.edu/cfr/text/12/217.37>

12 C.F.R. § 3.35
<https://www.law.cornell.edu/cfr/text/12/3.35>

12 C.F.R. Subpart D - Risk-Weighted Assets - Standardized Approach
<https://www.law.cornell.edu/cfr/text/12/part-217/subpart-D>

17 C.F.R. § 242.203
<https://www.law.cornell.edu/cfr/text/17/242.203>

17 C.F.R. § 242.204
<https://www.law.cornell.edu/cfr/text/17/242.204>

Anuj Gangahar, Goldman Loses Co-Head of Stock Lending to Hedge Fund, Financial News (Apr. 2, 2003)
<https://www.fnlonon.com/articles/goldman-loses-co-head-of-stock-lending-to-hedge-fund-20030402>

CME Group (2020), Cash Interest Pass Through Program FAQ
<https://www.cmegroup.com/clearing/financial-and-collateral-management/files/interest-pass-through-rate-faq.pdf>

CME Group (2021), CME Term SOFR Reference Rates
<https://www.cmegroup.com/market-data/files/cme-term-sofr-reference-rates-faq.pdf>

CRE52.10 (2019), Basel Committee on Banking Supervision
https://www.bis.org/basel_framework/chapter/CRE/52.htm

CTFC, Futures Commission Merchants FCMs
<https://www.cftc.gov/IndustryOversight/Intermediaries/FCMs/fcmsegregationfunds.html>

DTCC, GCF Repo
<https://www.dtcc.com/clearing-services/ficc-gov/gcf-repo>

DTCC, Securities Financing Transactions (SFT) Clearing Service
<https://www.dtcc.com/-/media/Files/Downloads/Clearing-Services/SFT-Clearing-Service-Fact-Sheet.pdf>

Eurex Clearing (2019), Innovative Buy-Side access models for central clearing
<https://www.eurex.com/resource/blob/244234/e400df7322679f9e7c4060ef6656fc7a/data/innovative-buy-side-access-models-for-central-clearing-presentation.pdf>

Federal Reserve Bank of St. Louis, FRED Economic
<https://fred.stlouisfed.org/>

Financial Stability Oversight Council, Appendix A
<https://home.treasury.gov/system/files/261/here.pdf>

FINRA, Rule 4210. Margin Requirements
<https://www.finra.org/rules-guidance/rulebooks/finra-rules/4210>

Gara Afonso et al. (2020), The Market Events of Mid-September 2019, Staff Report No. 918, Federal Reserve Bank of NY Staff Reports.
https://www.newyorkfed.org/medialibrary/media/research/staff_reports/sr918.pdf

Group of Thirty Working Group on Treasury Market Liquidity, US Treasury Markets Steps Towards Increased Resilience
https://group30.org/images/uploads/publications/G30_U.S._Treasury_Markets-_Steps_Toward_Increased_Resilience__1.pdf

Jong-Hyung Lee, Korea Securities Depository, Market booms and busts-A SLB Default Case
https://www.acgcsd.org/data/acg17/Presentation/6-04_Presentation%20by%20KSD.pdf

Los Angeles County Employees Retirement System (2020), LACERA Annual Financial Report 36
http://www.lacera.com/sites/default/files/assets/documents/general/acfr_2020.pdf

Market Axess (2021), Proxy Statement and Notice of Annual Meeting of Stockholders
<https://investor.marketaxess.com/static-files/c4e3368b-80a6-4744-bf84-f8258154a067>

MIT OpenCourseware, Introduction to Probability Lecture 13: Conditional expectation and variance revisited

https://ocw.mit.edu/resources/res-6-012-introduction-to-probability-spring-2018/part-i-the-fundamentals/MITRES_6_012S18_L13AS.pdf

National Securities Clearing Corporation (NSCC), Rules and Procedures

https://www.dtcc.com/~media/Files/Downloads/legal/rules/nscc_rules.pdf

NSE, SLB Brochure, Securities Lending and Borrowing Mechanism

https://www1.nseindia.com/invest/content/SLB_brochure.pdf

NZX Clearing Depository Participant Fee Schedule effective 1 May 2021

<https://www.nzx.com/services/market-participants/participant-fees>

OCC (2021), Member Directory

<https://www.theocc.com/Company-Information/Member-Directory>

OCC (2021), Schedule of Fees

<https://www.theocc.com/Company-Information/Schedule-of-Fees>

OCC Rule 604

https://www.theocc.com/getmedia/9d3854cd-b782-450f-bcf7-33169b0576ce/occ_rules.pdf

OCC, Margin Methodology

<https://www.theocc.com/Risk-Management/Margin-Methodology>

OCC, OCC Stock Loan-Hedge Program FAQs

<https://www.theocc.com/Clearance-and-Settlement/Stock-Loan-Programs/Stock-Loan-FAQs>

Options Clearing Corporation, The Options Clearing Corporation Disclosure Framework For Financial Market Infrastructures 10 (2021)

<https://www.theocc.com/getmedia/4664dece-7172-42a5-8f55-5982f358b696/pfmi-disclosures.pdf>

Orange County Employees Retirement System (2020), OCERS Comprehensive Annual

Financial Report 37 https://www.ocers.org/sites/main/files/file-attachments/ocers_2020_ar_6-16-2021.pdf?1630024748

Post-Trade Name Give-Up on Swap Execution Facilities, 85 Fed. Reg. 44693 (Jul. 24, 2020)

<https://www.federalregister.gov/documents/2020/07/24/2020-14343/post-trade-name-give-up-on-swap-execution-facilities>

Press Release (Oct. 15, 1985), Nobel Prize Organization, This Year's Economic Prize Awarded for Pioneering Studies and of Financial Market

<https://www.nobelprize.org/prizes/economic-sciences/1985/press-release/>

Reserve Bank of New Zealand, Official Cash Rate (OCR) decisions and current rate
<https://www.rbnz.govt.nz/monetary-policy/official-cash-rate-decisions>

Securities Borrowing & Lending (SBL), Overview, Bursa Malaysia
https://www.bursamalaysia.com/trade/post_trade/securities_borrowing_lending/negotiated_transaction/overview

SEC, Key Points About Regulation SHO
<https://www.sec.gov/investor/pubs/regsho.htm>

Stocks Traded, Total Value (Current US\$), The World Bank
https://data.worldbank.org/indicator/CM.MKT.TRAD.CD?most_recent_value_desc=true

Syllabus (2008), Economics 234C, Financial Decision-Making in Firms
https://eml.berkeley.edu/~webfac/malmendier/e234c_s08/234C_revised.pdf

The Federal Reserve, Commercial Paper Rates and Outstanding Summary
<https://www.federalreserve.gov/releases/cp/about.htm>

TWSE, FAQs -Taiwan Stock Exchange Corporation
<https://www.twse.com.tw/en/page/products/sbl/faq.html>